AVIATION

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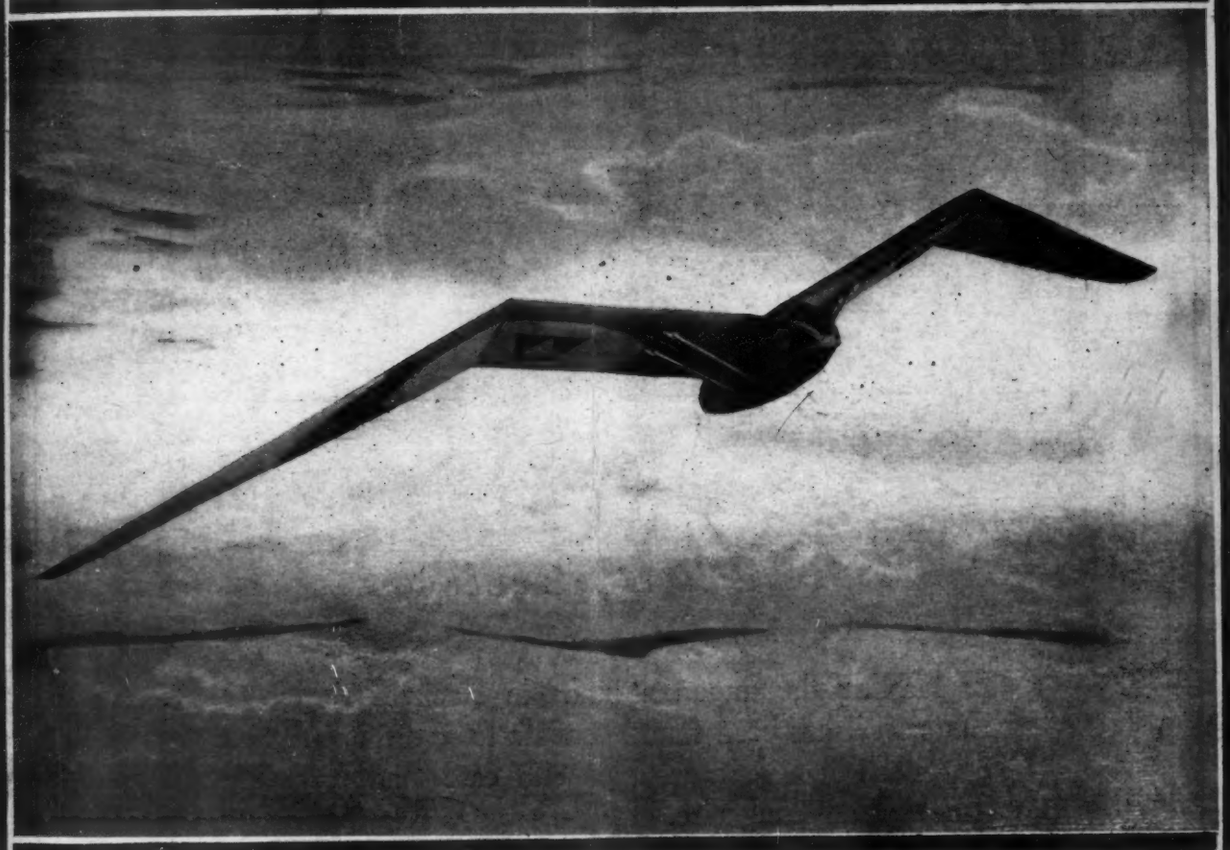

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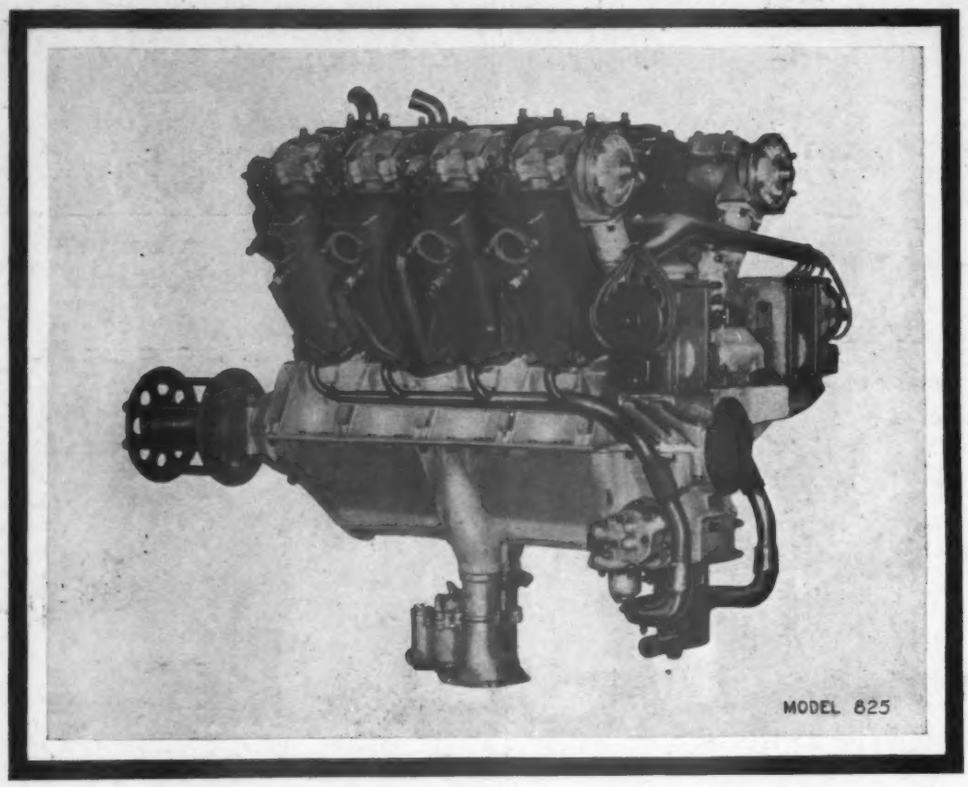

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SEPTEMBER 25, 1922

AVIATION

VOL. XIII. NO. 13

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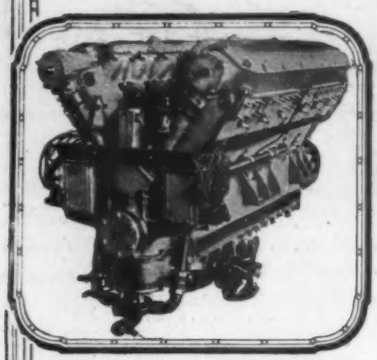

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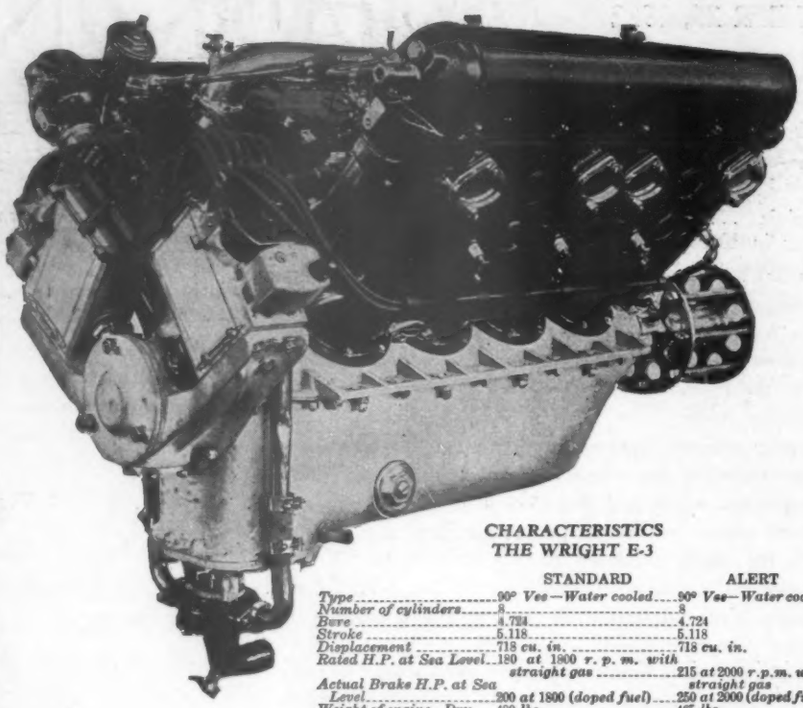

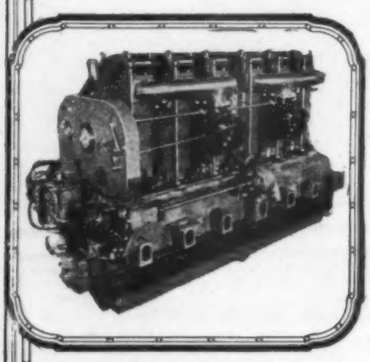

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Number of cylinders	8	8
Bore	4.724	4.724
Stroke	5.118	5.118
Displacement	718 cu. in.	718 cu. in.
Rated H.P. at Sea Level	180 at 1800 r. p. m. with straight gas	215 at 2000 r.p.m. with straight gas
Actual Brake H.P. at Sea Level	200 at 1800 (doped fuel)	250 at 2000 (doped fuel)
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Lbs. per actual B.H.P.	2.4	1.86
Length Overall	49 1-8 in.	49 1-8 in.
Width Overall	33 7-16 in.	33 7-16 in.
Height (Engine bearer to top)	18 3-4 in.	18 3-4 in.
Fuel Consumption (lbs. per H.P. Hr.)	.48	.48
Oil Consumption (lbs. per H.P. Hr.)	.015	.015

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VIRGINIUS E. CLARK
EDWARD P. WARNER
RALPH H. UPSON, CONTRIBUTING EDITORS

Vol. XIII SEPTEMBER 25, 1922 No. 13

Common Sense in Air Transport

ELSEWHERE in this issue there appears a letter from the Secretary of War in which, commenting on a recent editorial in AVIATION, he emphasizes the importance of sound finance and sane management in commercial aviation as exemplified by the operation of the Detroit-Cleveland service of the Aeromarine Airways.

The summer season's operations of this airline has closed with a clear record of perfect performance and perfect safety. Equally important is the fact that the operating company has actually made money in transporting passengers by air. Compared with the much discussed European airways, where a heavy subsidy, in some cases attaining 30 per cent of the gross receipts, pays an important role in demonstrating the profit-making capacity of air transport, the Detroit- Cleveland airway stands out as a model for other enterprises to copy.

Charles F. Redden, whose foresight and management have been largely responsible for the success of this the Great Lakes airway, started the route in a sensible manner. He first interested the local business men in the project, showing them how such a service would be of direct benefit to them in a business way. He also pointed out the incentive such an airway would be to tourists visiting these cities. It was this broad gaged viewpoint that made possible the complete success of the enterprise.

As a result of this encouraging showing it is probable that next year other airways will come into being to supply the want, existing between numerous centers of population, of an accelerated passenger service, which the railroads, for various reasons, cannot fulfill. It is to be hoped that such enterprises will be as carefully and sensibly directed as the Detroit-Cleveland airway.

Commercial Aviation in Europe

COMMERCIAL Aviation in Europe, according to Prof. E. P. Warner who has just returned from an extensive trip abroad, may be summed up in two general statements which are the result of observations he made in the course of 2000 miles of air travel in England, France, Belgium, Holland, Germany, Austria and Czechoslovakia.

The first is that every civilized government in the world that is not bankrupt, with the exception of the United States, is finding it worthwhile to develop aviation. At the back of their minds is the military necessity for proper aerial defense. Nearly all grant subsidies, the French being the heaviest and the English about the lightest. Even in Austria, in the last stages of financial collapse, an air transport company is being planned.

The second is: it has been shown that if a commercial aviation enterprise is operated solely as a commercial undertaking, without regard for possible military use, and applying the same methods of sound business management as would be required of any ordinary activity, there is every prospect that it can be made to stand on its own feet. As an example of what can be done, one English line during June made 84 trips between London and Paris, with only one airplane. This machine travelled a total distance of 19,000 miles, with only one forced landing and that due to fog. Twenty trips were made in five days, or an average of 900 miles each day, which meant about ten hours of flying daily. During all this, the advertised schedule was maintained. What more, one English company is operating successfully without subsidy.

Stunt Flying in Civil Aviation

AVIATION has consistently opposed the practice of stunt flying in civil aviation. The best arguments against stunt flying are as a rule furnished by pilots who do this constantly as well as by the tragic accounts of the consequences of this form of flying.

Earle S. Daugherty, who has had a long experience as an acrobatic flier in the Army as well as in civil aviation, in a recent interview gave perhaps the most favorable argument that can be found in favor of stunt flying.

He believes the question can best be answered by the fact that there is no thrill to straight flying. Considering the further fact that commercial aviation, up to the present time has been looked upon by the general public as an amusement it naturally follows that the patrons of the present day flying fields expect to get a real thrill from their flight. With the coming of well established commercial airlines, the short joy rides will become a thing of the past. Travel by air will become commonplace and people will use the airplane as they now use the trains, steamboats and automobiles.

Stunt flying is an art. Stunting causes more than forty per cent of deaths and injuries in airplane accidents, and it is not surprising as there are perhaps not more than a dozen competent commercial stunt fliers in the United States while hundreds of pilots throughout the country will not refuse a paid passenger for a stunt ride.

Stunt flying is necessary to testing and essential to warfare. It might be called a necessary evil. All pilots should know how to stunt so that in case of an emergency they will be able to act quickly, but the habit of stunting with passengers by amateurs for thrill is dangerous.

Mr. Daugherty has carried over ten thousand passengers at his Long Beach flying field, and it is interesting to note that eight out of ten of his women passengers have taken stunt rides while only five out of ten men have gone in for the thrill. Quite a number of men and women past eighty have taken stunt rides and enjoyed it. Mr. Daugherty ends up by saying that he would not think of employing a pilot even for straight flying who did not have sufficient training in stunt work.

Gliding Experiments in Europe - 1922

An Eyewitness' Review of the Results Achieved At the Recent French and German Gliding Meets

By Edward P. Warner

The art and practice of gliding are very old, their origin being lost in dim antiquity. The building and operation of gliders became a common pastime among school boys in the United States some fourteen years ago, when the imagination of youth was first being stirred by the demonstration of the Wright Brothers and their rivals and successors. The German meets in the Rhön began in 1920, and interest in soaring flight has been at a white heat to the east of the Rhine ever since that time. Only within the past two months, however, have the American people taken a real interest in this phase of aeronautics. The flights of Hentzen, Martens, Hackmack, and others in Germany, together with the holding of a French competition, have suddenly awakened an enthusiasm for soaring flight over all the world, an enthusiasm which sometimes leads to hopes and prophecies overshooting the mark of probable attainment. The achievements of this summer, particularly those of the three German pilots enumerated above, have indeed been marvelous, and soaring, gliding, or sailplaning, call it by whatever name you will, certainly has taken a place in the aeronautical field. At the same time, nothing has been done during the past summer, and there has been no indication of approach to any achievement which would justify some of the wild predictions recently made. Wonderful as were the flights carried out by Hentzen, they do not mean that we are ready to cross the Atlantic without the expenditure of power nor even that we have taken any real step toward the realization of a feat so extraordinary.

The results of the summer's experiments may be summarized in a few words. It has been proven that it is possible for a skilful pilot on a very efficient glider to remain aloft practically indefinitely over a favorable terrain of which the pilot knows every detail. Given these conditions, long flights are made by taking advantage of ascending currents. The theory on which the flights of Hentzen rest is the same as the theory which accounts for the ten-minute glide made by Mr. Orville Wright in 1911, but the advance of aerodynamic knowledge in the meantime has been such that Hentzen and his co-workers can remain aloft under conditions much less favorable than those required by Mr. Wright. This is the story of soaring flight as it appears to me at the present time. It is a straightforward story in any case, and it is not necessary to invoke the black art or to credit the pilot with superhuman powers, either inborn or developed through mechanical aid.

The French Meeting

The French meet may be discussed first, since it was first chronologically. The meet was held in picturesque Auvergne, about fifteen miles from Clermont-Ferrand, and the original plans called for all flights to start from the Puy de Combegrasse, which rises to a height of about 3700 ft. above sea level and allows a drop of some 400 ft. vertically to a nearby field. During the meet, however, it was found by trial that better flights could be obtained with the prevailing westerly wind by starting from La Toupe, a much lower peak about half a mile away. The advantage gained by the change lay in the smoother and broader slope of the second hill. The terrain was not altogether satisfactory. The peaks are volcanic and the ground is very rough and thickly strewn with lava rock. A number of the gliders started out with skid landing gears, but every machine of this type except one was damaged in landing and all of them subsequently changed over to wheels.

The machines used in the French competition, as shown by some of the accompanying illustrations, were in most cases quite different from the popular idea of a glider. In fact, several of them were merely small airplanes with the engines removed, with structural parts lightened up slightly, and with the pilot's seat moved forward to restore satisfactory balance. Only in a few scattering instances, aside from the freaks, had they the appearance of having been built for no other purpose and with no other thought than gliding. Examples of this tendency to make use of previous airplane

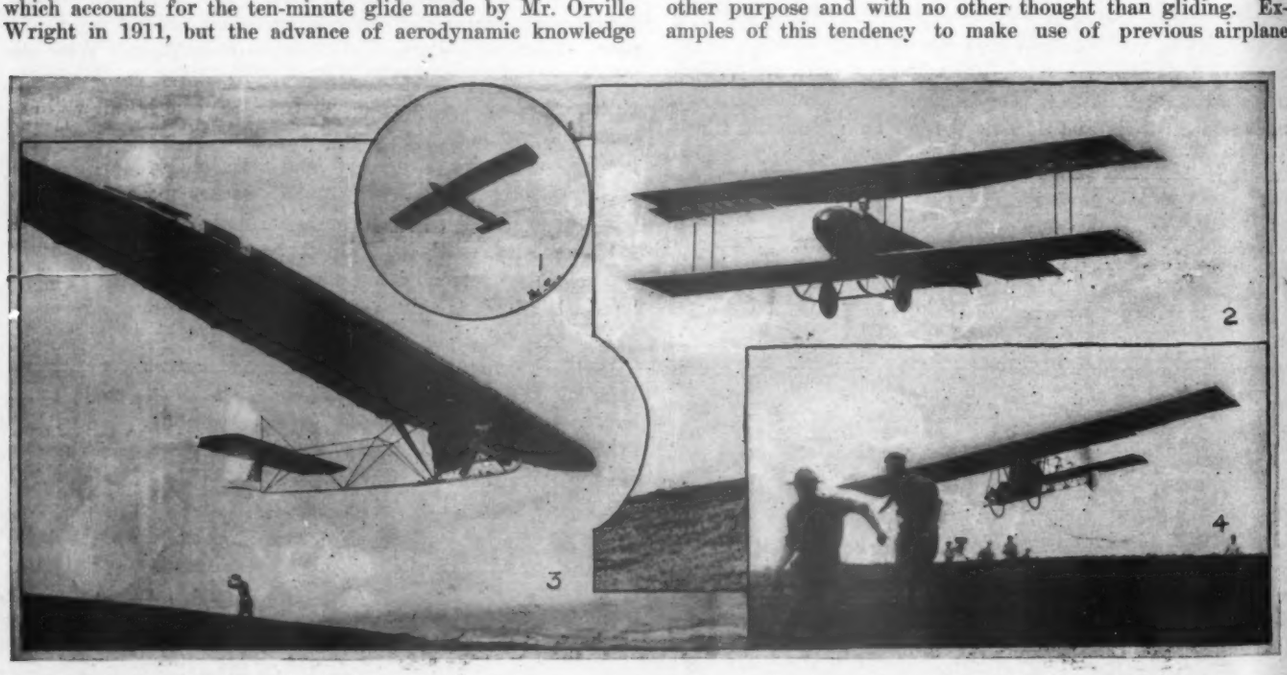


Photo Kadel & Herbert

Fig. 1—H. P. Hentzen on the Hannover "Vampire," during its 3-hr. flight. Fig. 2—Lucien Bossoutrot on the Farman glider which won most of the events of the French competition. Fig. 3—Baron Freytag on a Harth sailplane. Fig. 4—E. T. Allen takes off on the sailplane of the Aeronautical Engineering Society of M.I.T.

design were found in the machines entered by Farman (both monoplane and biplane), Potez, and Bellanger. Despite the fact that they had their origin in airplanes, the construction of many of these gliders was extremely light and the loading was below 1.7 lb. per sq. ft. in most cases.

In the Farman monoplane (No. 19), which made the best record, the loading was cut down to 1.5 lb. per sq. ft. It will be noted that the names just mentioned are those of famous airplane manufacturers, and a fundamental difference between

Particulars of the Aircraft Entered in the French Gliding and Soaring Competition

MAKE	PILOT	SPAN m.	LENGTH m.	AREA sq.m.	WEIGHT kg.
1. Abbins M*	M Abbins	8.00	3.00	12.0	40.0
2. De Monge M	Jean Casale	11.00	7.62	25.0	30.0
3. De Monge M	J. R. Rocques	11.00	7.62	25.0	80.0
4. Nessler B	Eric Nessler	6.60	4.50	18.0	65.0
5. Dewoitine M	Barbot	11.30	4.85	11.5	80.0
6. Beuchet M	G. Beuchet	9.00	5.00	15.0	50.0
7. Derivaux B	E. Derivaux	4.80	6.60	20.0	40.0
8. Coupet M	Lucien Coupet	11.00	6.00	20.0	40.0
9. Gilbert M	H. Pisson	8.00	4.00	13.4	60
10. Groux M	Geo. Groux	8.00	4.00	16.0	30.0
11. Pimoule O	J. Pimoule	5.35		10.0	30.0
12. Massy M	Max Massy	11.00	4.20	20.0	100.0
13. Deshayes M	Alfred Camard	16.00	5.20	22.0	100.0
14. Chardon-3 B	A. Cuendet	5.60	3.50	15.0	15.5
15. Chardon-4 M	" "	11.00	4.80	18.0	40.0
16-Chardon-5 B	" "	5.60	3.50	15.0	12.5
17. Thourouss M*	G. Thourouss	4.40	3.50	12.5	50.0
18. Montagne M	D. Montagne	15.00	5.00	18.0	18.0
19. Farman M	L. Bossoutrot	10.00	6.00	12.0	40.0
20. Grandin O	Henri Grandin	14.50	8.00	50.0	80.0
21. Rollé M	J. Rollé	9.00	4.00	11.0	23.0
22. Rousset M	M. Rousset	9.00	4.00	14.0	40.0
23. Potez B	Douchy	8.00	5.90	21.0	110.0
24. Sablier M	G. Sablier	9.00	4.50	13.5	40.0
25. Detable M	O. Detable	5.00	5.00	23.0	100.0
26 Peyret M	L. Peyret	6.60	4.90	15.0	45.0
27. Vallette M	A. Vallette	7.00	2.20	8.0	25.0
28. Bernasconi M*	E. Bernasconi	7.00	4.00	10.0	30.0
29. Griffrath M	M. Griffrath	10.60	5.35	16.0	38.0
30. Lefort T*	Lucien Lefort	8.40	4.50	25.0	120.0
31. Alvi M	Pierre Alvi	8.50	6.00	13.0	58.0
32. Trofin T	Jean Trofin	8.00	6.50	24.0	72.0
33. Bréguet M				20.0	80.0
34. Julien M	G. Julien	7.50	3.75	10.0	35.0
35. Aubiet B*	Marceau Aubiet	5.50	4.80	11.0	40.0
36. Caux H	Jules Caux	5.50	3.50	20.0	32.0
37. Bellanger-Denhaut B	Fétu	10.00	8.00	19.0	90.0
38. Landes & Derouin M	R. & T. Landes	11.00	4.50	16.0	50.0
39. M.I.T. M	E. L. Allen	7.50	4.50	11.2	34.0
40. Clément T	G. Sardier	5.50	3.50	12.5	75.0
41. Dewoitine M	Lt. Thoret	11.30	4.85	11.5	80.0
42. Levasseur M	Henri Pitot	12.20	6.50	20.0	90.0
43. Dits M	R. Moineau	12.00	5.50	20.0	50.0
44. Paulhan B	L. Paulhan	7.10	6.10	20.0	130.0
45. Bonnet B	M. Descamps	8.74	5.50	18.0	65.0
46. Gafner B	J. Gafner	7.30	4.80	22.0	46.0
47. Farman B	L. Bossoutrot	9.00	7.00	25.0	125.0
48. V. Maneyrol	A. Maneyrol	10.00	4.00	23.0	150.0
49. Vercruysse *O	Ch. Vercruysse	7.00	3.00	10.0	50.0
50. Boisson *B		5.75	5.50	16.0	25.0

Note—The aircraft Nos. 14, 15, 16, 28 and 46 are Swiss; No. 17 is Belgian; No. 32 Roumanian, and No. 39 American. Those marked with an asterisk (*) are *aviettes*.

ABBREVIATIONS

M—Monoplane
B—Biplane
T—Triplane
O—Ornithopter
H—Helicopter

Photo Kadel & Herbert

Above—A take-off of the Hannover "Vampire." Below—The German Secretary of State congratulates the Vampire's pilots, Martens (left), and Hentzen (right)

the French and German meets lay in the source from which the entrants came. In France, practically all of the 50 entries came either from airplane companies or from individual inventors, the only machine entered by a non-profit-making organization being the glider designed and built by student members of the Aeronautical Engineering Society at the Massachusetts Institute of Technology.

The Dewoitine Monoplane

The conspicuous exception to the rule regarding light loading and close following of airplane design practice was found in the monoplanes produced by M. Dewoitine. These carried 2.5 lb. per sq. ft. and were distinguished by the flexible trailing edges of the wings. The trailing edge was as flexible as on the old Caudron, but had the advantage over the Caudron design that it always preserved a good aerofoil form. The upper and lower surfaces of the wing were made separately from the rear spar to the trailing edge and the upper and lower cap strips of the rib were not connected together. They could therefore bend up and slide over each other while always preserving a smooth double-surfaced form, the maximum movement of the trailing edge being about six inches. This feature is shown in one of the photographs. A Dewoitine was the first machine to make a duration of 2 min. 40 sec., and the flight which Barbot made in passing that mark was one of the most remarkable of the entire meet. The time may seem insignificant as compared to that made by the Germans, but in view of the different conditions which existed in France and at the Wasserkuppe, it seems best to consider the records at first quite independently, reserving comparison until later.

During the first few days of the French meet, matters proceeded very slowly. With the exception of Allen, the American pilot, no one there had ever done any gliding and they were not quite sure how to proceed. During the first five days

Allen with the American machine showed the way to all the others and succeeded in taking and holding during that time the lead in all the events for which prizes were offered. On Friday of the first week, however, an accident in taking off, due to a failure of the wind just as a start was made, wrecked the American machine, and since the second machine brought to France had not been officially entered Allen was debarred from further competitive attempts.

The following week, the last of the meet, showed a slow but steady improvement as pilots became more familiar with their machines and with local conditions. As to the skill of the pilots in general, there never was any question, for the large companies which entered machines had sent their best test pilots to fly them and the entrants included a large proportion of the best-known pilots in France, among them being Bossoutrot, Douchy, Casale, Barbot, Thoret, Sardier, and numerous others. The record was raised bit by bit until it reached nearly three minutes. And then on the last day of the meet Bossoutrot and Coupet, the former in a Farman monoplane and the latter in his own monoplane, went far beyond all previous performances. Bossoutrot remained aloft for 5 min. 18 sec. and Coupet for a little over four minutes. These flights, no less than the German performances, must be attributed to the use of rising currents, as the mean rate of descent was much less than would be possible for a straight glide through still air. Douchy later made a flight lasting 9 min., but that can hardly be ranked with the others as his departure was taken from the summit of the Puy du Dome, the highest mountain in the neighborhood, whence a sheer drop of over 1500 ft. was available.

Results of the French Competition

The performances officially recorded at the French meet are as follows:

AGGREGATE FLIGHT ENDURANCE

1. Farman 47 (Bossoutrot and Paulhan), 49 min., 55 sec.
2. Farman 19 (Bossoutrot), 48 min. 25 sec.
3. Chardon 16 (Chardon), 34 min. 15 sec.
4. Coupet 8 (Coupet), 31 min. 20 sec.
5. Bonnet-Clément 45 (Descamps), 19 min. 23 sec.
6. Potez 23 (Douchy), 14 min. 12 sec.
7. M.I.T. (Allen), 12 min. 27 sec.
8. Dewoitine 5 (Barbot), 7 min. 41 sec.
9. Clément 40 (Sardier), 4 min. 21 sec.
10. Levasseur-Abrial 42 (Pitot), 2 min. 55 sec.
11. Bellanger-Denhaut 37 (Fétu), 55 sec.

LONGEST SINGLE FLIGHTS

1. Farman 19 (Bossoutrot), 5 min. 18 sec.
2. Coupet 8 (Coupet), 4 min. 50 sec.
3. Dewoitine 5 (Barbot), 2 min. 43 sec.
4. Bonnet- Clément (Descamps), 2 min. 18 sec.
5. Levasseur-Abrial (Pitot), 1 min. 58 sec.
6. Farman 47 (Paulhan), 1 min. 54 sec.
7. M.I.T. 39 (Allen), 1 min. 47 sec.
8. Potez (Douchy), 1 min. 46 sec.
9. Chardon (Chardon), 1 min. 16 sec.
10. Clément (Sardier), 1 min.

LOWEST SINKING SPEED

1. Farman 19 (Bossoutrot), 0.47 m. per second.
2. Coupet 8 (Coupet), 0.625 per second.
3. Bonnet-Clément 45 (Descamps), 0.69 m. per second.
4. Farman 47 (Paulham), 0.915 m. per second.

MAXIMUM HEIGHT OVER STARTING POINT

1. Farman 19 (Bossoutrot), 80 m.
2. Coupet 8 (Coupet), 53 m.
3. Bonnet-Clément (Descamps), 30 m.

PRECISION LANDING CONTEST

1. Farman 19 (Bossoutrot), 0 m. (Landed on spot.)
2. Farman 47 (Paulhan), 3 m.
3. Bonnet-Clément (Descamps) 4 m.

MAXIMUM ENDURANCE IN HORIZONTAL FLIGHT

1. Farman 19 (Bossoutrot), 3 min. 30 sec.
2. Coupet 8 (Coupet), 3 min. 15 sec.

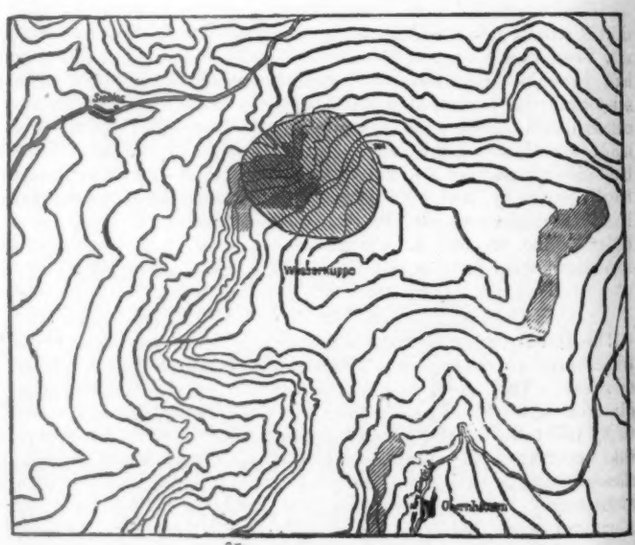
After the official closure of the meeting several competitors continued their experiments and several distance flights were made from the Puy-du-Dome on Aug. 24 for a prize offered by the city of Clermont-Ferrand. This prize was won by Douchy on the Potez sailplane with a flight of about 3 1/3 miles. The results of this competition were the following:

1. Potez 23 (Douchy), 5,850 m. in 5 min. 5 sec.
2. Farman 19 (Bossoutrot), 5,280 m. in 7 min.
3. Dewoitine 41 (Barbot), 4,650 m. in 8 min. 56 sec.
4. Coupet 8 (Coupet), 3,150 m. in 4 min. 45 sec.

The French meet was unfortunately marred by several accidents, one of them being fatal. The accidents were attributable in most cases to insufficient control and stability or to the pilots attempting to make long flights without sufficient gliding experience. The fatal accident was a straight spin into the ground resulting from a stalled turn at a height of about 75 ft.

The German Meeting

Turning from the French meet to the German one, which I visited after leaving Clermont-Ferrand, a number of differences in the surrounding conditions were apparent. The German flights were started from the summit of the Wasserkuppe, the highest peak in the Rhön mountains. It rises to 3100 ft. above sea level and faces valleys running off into two directions (see map reproduced by courtesy of *L'Aéro-Sports*). All of the very long flights were made in a west wind, which made it possible to glide against the wind down the valley of the Fulda River. For the benefit of those who wish to find the place in an atlas, it may be said that it is about 100 miles east of Frankfort and very near to the village of Gersfeld. The slope of the German hill was more gradual than that used by the French, and the ground was so much smoother so that the use of skids for landing became entirely practicable.



Contour map of the Wasserkuppe region. The circular shaded area is the best soaring region; the areas shaded in opposite sense indicate woods. The contour lines are spaced 25 meters. The prevailing wind blows from N.W. (upper L.H. corner)

The German machines could be divided into four classes. The first, from which came all of the records, were cantilever monoplanes. They had in most instances wings partially covered with plywood near the leading edge, plywood fuselages, and the usual complement of control surfaces except for the frequent omission of the stabilizer, all of the horizontal tail surfaces being made movable. The loading of these monoplanes was higher than Americans have ordinarily considered desirable for a glider, the very best results being obtained with machines carrying about 2.4 lb. per sq. ft. The second class were the so-called school machines, for use by less

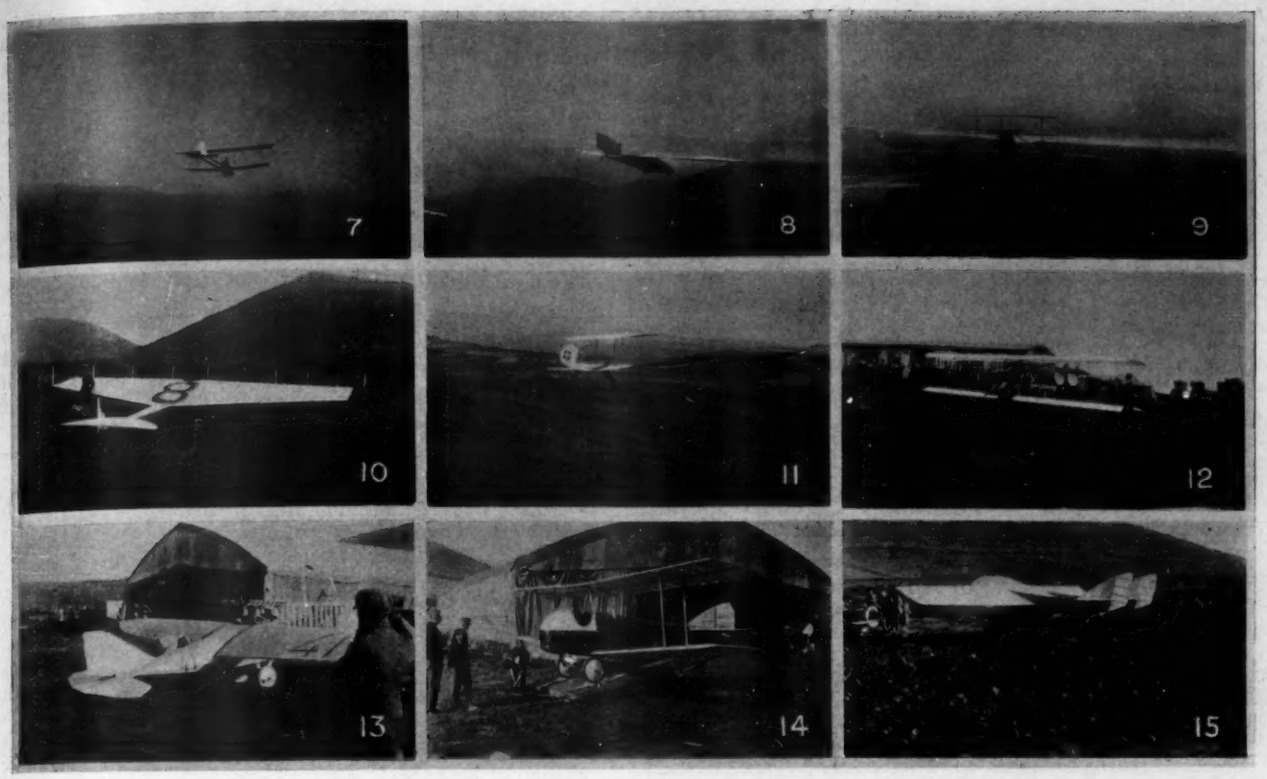


Fig. 7—Klemperer biplane. Fig. 8—Hannover "Greif." Fig. 9—Clement triplane. Fig. 10—Coupet monoplane. Fig. 11—Chardon on his Chanute type glider. Fig. 12—Fokker 2-seater glider. Fig. 13—Dewoitine monoplane. Fig. 14—Potez biplane. Fig. 15—De Monge monoplane

skilful pilots. Indeed, a certain number of pilots have actually been trained to glide on these machines without having had previous experience in flying powered airplanes. The school machines were almost all biplanes of rugged and simple construction. The third class, and the simplest of all, was made up of the arm-stick or body-controlled gliders. These have been familiar in America for many years. They can hardly teach anything of aerodynamics, and their operation is rather dangerous and requires acrobatic ability of no mean order. The wisdom of continuing to build these machines seems doubtful.

The "Original" Conceptions

The fourth class includes those wholly original conceptions which are not controlled in the same manner as the ordinary airplane. The most striking illustration of this type was a glider entered by Herr Schultz. He was refused permission to fly officially, as the construction of his glider was so rough that the technical committee deemed it unsafe, but he nevertheless made a number of very successful flights for his own amusement. His machine was remarkable in the omission of a rudder, both directional and lateral control being secured by movable wing tips. The two tips were controlled by two separate levers, one of which also controlled the elevator, and by turning opposite tips up and down in the desired relation to each other it was possible for the pilot either to bank or to turn. He apparently had satisfactory control at all times.

Some of the entrants also had no elevators on their gliders, the whole tail being fixed and longitudinal control being obtained by changing the angle of attack of the wings. The best known devotee of this scheme is the Harth-Messerschnitt firm. It has been shown possible for a skilled pilot to control a machine without an elevator, but it evidently requires special training as several minor accidents result from insufficient longitudinal control on variable-angle machines. The freak design was much less in evidence in Germany than in France, two years of German experience having sufficed to weed out most of the imitation birds.

Returning to the subject of how it was done, and undertaking to make a comparison between the machines which competed at the two meets, the great superiority of the German performances over the French can be attributed to three causes. In the first place, there is no doubt that the best of the German machines were superior in efficiency to anything that competed in France. Quite aside from any questions of rising currents, the "Vampyr" glider designed by Mr. Madelung, built at Hannover and flown by Hentzen and Martens had a phenomenally flat gliding angle. Even when there was no indication of rising currents and none to be expected the machine travelled across country for amazing distances with barely perceptible loss of altitude. It is unnecessary to discuss here the characteristics of the design which gave such excellent performance, as it has already been described in AVIATION and as Mr. Madelung himself has recently contributed an interesting note on the subject. The only evident changes from the original plan of the machine were in the substitution of warping for ailerons as a means of lateral control and in the elimination of the footballs which served as wing skids. The warp is confined to a triangular portion at the tips of the wings, and this portion is very flexible so that the controlling edge can yield somewhat in flight just as it can in the Dewoitine. It is a remarkable fact that the old Hannover machine did much better than the new one, although any aeronautical engineer would say that the "Greif" with its very carefully streamlined fuselage would have a better L/D ratio than the "Vampyr."

The second factor in the greater success of the Germans was a better territory. The Wasserkuppe is undoubtedly superior to anything in the neighborhood of Clermont-Ferrand as a site for gliding experiments.

The third and last element was the knowledge of the country which the pilots possessed. No one had ever tried to glide from the Puy de Combegrasse before the meet opened. The Germans had been flying from the Wasserkuppe for a number of years, and in addition to flying from it they had made a detailed study of the motions of the air in every part of the surrounding country under conceivable meteorological conditions. Nothing was more striking to an alien observer at Gersfeld than the painstaking care with which the structure of the atmosphere had been investigated.

Results of the German Competition

The results of the German sailplane competition, as announced by *Flugsport*, were as follows:

A) SOARING MACHINES

1. Grand Prize of the Rhön

Winner: Hannover "Vampire," pilot Hentzen. Time 3 hr. 6 min. Distance 4.5 km. Height difference 360 m.

2. Lowest Mean Sinking Speed

First: Hannover "Vampire" (Hentzen), -1.05 m. per second.
Second: Darmstadt (Hackmack), -0.39 m. per second.
Third: Darmstadt (Botsch), -0.08 m. per second.

(It should be noted that the mean "sinking" speed of these three machines is *minus*, which means that they all landed at a level higher than their starting point.)

3. Greatest Flight Distance

First: Hannover "Vampire" (Hentzen), 10 km.
Second: Darmstadt (Hübner), 5 km.
Third: Darmstadt (Hackmack), 4.7 km.

(B) GLIDERS, CONTROLLED BY TAIL SURFACES

1. Maximum Total Flight Endurance

First: FWD Biplane (Seiferth, Spies), 30 min. 51 sec.
Second: Harth-Messerschmitt (Freytag, Harth, Hirth), 25 min. 43 sec.
Third: Espenlaub Monoplane (Schrenk), 15 min. 19 sec.
Fourth: Baden-Baden (Stamer), 7 min.

2. Greatest Flight Distance

First: Espenlaub Monoplane (Schrenk), 2.8 km.
Second: Dresden FVD Biplane (Seiferth), 2.7 km.
Third: Baden-Baden (Stamer), 1.8 km.

The Hannover "Vampire"

The Hannover "Vampire" sailplane in which the German pilots Martens and Hentzen made their long motorless flights is the same machine which Martens flew at the 1921 Rhön sailplane meet, except that it embodies some minor modifications.

The chief difference between the two types is that the 1922 type Hannover has warping wings instead of ailerons, and that its total wing area is somewhat larger. A comparison between the data available for the 1922 model and those of 1921 model described in the Aug. 7, 1922, issue of AVIATION shows that the increase in wing area was obtained by increasing the chord of the tapering sections of the wings, whereas the chord of the parallel wing portions has remained unaltered.

Following are the principal characteristics of the Hannover "Vampire," 1922 model, which was designed by students of the Hannover technical high school, and built by the Hannover Waggon Works, war-time airplane manufacturers.

SPECIFICATION OF THE HANNOVER "VAMPIRE"

Span	42 ft. 6 in.
Overall length	17 ft. 1½ in.
Maximum height	4 ft. 2 in.
Total wing area	172 sq. ft.
Chord, parallel section	4 ft. 9 in.
Chord, tapering section	3 ft. 2 in.
Weight empty	264 lb.
Weight loaded	440 lb.
Wing loading	2.75 lb./sq. ft.

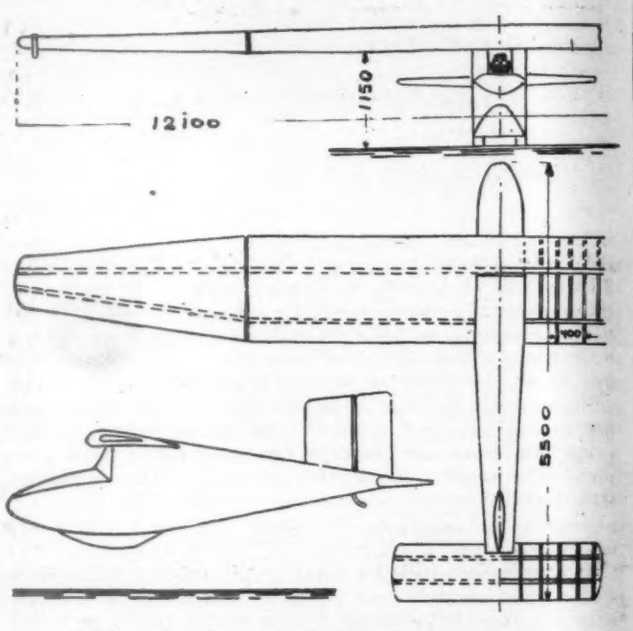
The first of the notable duration flights made this year occured on Aug. 18, when Arthur Martens remained a'oft 1 hr. 4 min. This flight was made in an attempt to set up a new world's record and win the 100,000 Mark prize offered by the Society of German Aircraft Constructors for the first soaring or gliding flight of more than 40 min. duration, providing that the sailplane return over the starting point after 40 min. and then make an additional flight of 5 km. (3 miles) length. Martens started flying in figure eights and circles, and 41 min. after the take-off he re-crossed the starting line, when he began a long glide which ended near the village of Lutters, a distance of 7½ miles from the summit of the Wasserkuppe. Six minutes after starting Martens completed the first figure eight and passed over the starting point at a height of 200 ft. His seventh figure eight was made 30½ min. after the start and at a height of only 120 ft. Then he made a huge circle, passing over the starting point for the eighth time 55 min. 35 sec. after taking off, at a height of about 165 ft. His eighth figure eight was completed in 41 min. at about 150 ft. elevation and then followed the glide which took 23 min.

On Aug. 19 Hentzen, a fellow worker of Martens, flew the same sailplane for 2 hr. 10 sec. At the take-off the wind was blowing at 14-18 m.p.h. and for a time the pilot flew in circles and figure eights until, 45 min. after his start, he was about 1000 ft. above the starting level. The wind by this time had fallen to half its previous speed, and the height decreased to 400 ft. after 66 min., and to 250 ft. after 90 min. The starting line was crossed at about the latter height 1 hr. 45 min. after the take-off.

Finally, on Aug. 24, Hentzen made his longest flight, of 3 hr. 7 min. duration. On this occasion he took off, it seems in a valley, far below the Wasserkuppe hill and landed on the top. In the course of this flight the sailplane reached a height of about 1000 ft. above the starting point.

Conclusions

Finally arises the question as to the usefulness of such experiments. It is a question which has been argued pro and con with much heat in many countries during the past month, and what I offer here is only my personal opinion. I consider gliding an excellent means of practicing for pilots who are so suited to make it possible. The piloting of a glider requires great delicacy and skill and the oldest of pilots on trying it



Outline drawings of the Darmstadt-6 sailplane

for the first time express themselves as delighted with the experience. In the second place, certain experiments can be made in flight more quickly and more cheaply with a glider than by any other means. This does not mean, however, that the glider is to replace the wind tunnel, as some enthusiasts have declared for the perfect control under which the laboratory experiment can be held gives it an advantage over every other type of research. Finally, gliding offers an incentive and to some extent a means for the investigation of atmospheric structure. The achievements of the past summer seem to me to have a bearing on aerography almost as important as on aeronautical engineering.

It would, of course, be very reckless to say or to imply that the limit of soaring development has been reached. The first great step has been taken in soaring with ascending currents, and nothing remains to be demonstrated along that line. There always exists the chance, however, that motorless flight in horizontal gusty winds, the theoretical possibility of which was long ago demonstrated by Langley, will be realized in practice. I do not believe that it has yet been done in any instance, but the time may come when we shall see true soaring without vertical motion of the air.

The Preliminary Design of Aircraft *

By l'Ingenieur en chef du Genie Maritime Fortant

Directeur du Service Technique de l'Aeronautique

Translated by J. C. Hunsaker, Commander (C.C.) U. S. Navy

Definition and Object of Aerotechnics †

Aerotechnics may be defined as that science (or group of sciences) whose application permits the conception and realization of "good" aircraft, understanding by "good", flying machines which fulfill, within the limits of the present state of the art, the manifold requirements of a specification determined by (or for) those who desire to use such aircraft.

The Specification for an Aircraft and its Contradictory Requirements

The general specification for an aircraft will always define qualitatively and quantitatively the principal *desiderata* which the designer or user wishes to see realized simultaneously on the type of machine to be created or adapted, for a more or less special but definite purpose.

An aircraft of any type should combine a certain number of principal characteristics which must be made compatible with one another. To realize each characteristic it is necessary to assign an appropriate fraction of the gross weight of the aircraft, the total power available or some other fundamental (cost, wing area, etc.) so that an approximate idea can be given of the order of magnitude to which *à priori* the design is limited. According to the type in view, certain desired characteristics can be given marked preponderance over others, while at the same time requiring that the less important characteristics shall not be unduly sacrificed.

The preliminary design of an aircraft is a special problem in harmonious assembly, just as is the case with any important technical product (locomotive, ship, bridge, motor, turret, etc.). The problem of conception while usually solvable in any particular case by methods widely divergent reaches a final solution by coordination, compromise and in consequence often by a knowledge of how to limit certain *desiderata* which otherwise may never be realized or be in part compatible.

Under such condition it follows that if there is an initial limitation of one of the fundamental characteristics (weight, power, cost, size, etc.) the design results in an inevitable compromise between the different features desired. Certain of these features cannot be magnified except at the price of a corresponding diminution of certain others considered to be less essential for the special application or mission in view.

As soon as it is realized that a compromise must be made, several good solutions can always be found, and the most satisfactory of such solutions corresponding to the best compromise under the particular circumstances must be determined by the reasoned application of aeronautical science.

Consequently, since the solution must be a compromise, the work of the designer of aeronautical material (or any other technical material) can never entirely please everybody no matter what is done. There are always critics who see in the unfortunate compromise only the features which have been sacrificed or reduced (for the benefit of others considered more important) and who refuse to judge the result as a whole as would seem both the reasonable and the fair thing to do. ‡

These preliminary essentials having been mentioned, it is still necessary before we can understand one another, to review in a few words the multiplicity and complexity of the principal characteristics which must be determined for every aircraft and between which characteristics our problem is to establish a just balance, taking account as well as possible of all the special conditions appropriate to each particular case.

The Principal Characteristics of an Aircraft

These principal characteristics, whose enumeration needs no extended explanation, can be summarized or classed as follows:—

(1) Structural characteristics: Strength, rigidity (maintenance of alignment); standardization, deterioration (effect of weathering and service conditions); facility of construction, maintenance and repair; fireproofing and fire resistance, etc.;

(2) Airworthiness characteristics (analogous to seaworthiness characteristics of a vessel): stability; controllability; facility of navigation; safety in take off, flight and landing; suitability for flight in rough air and for acrobatics (when necessary); speed range; seaworthiness of seaplanes, etc.;

(3) Performance characteristics: continuity of form and aerodynamical "fineness"; speed; climb; radius of action; stability; lift; ceiling; etc.;

(4) Economical or military characteristics (for commercial and military aircraft): useful load; comfort; ease of loading; armament; armor, convertible from civil to military use; resistance to enemy gun fire; economy at different speeds (consumption of fuel and oil); facility for stowage, take-down, erection and maintenance; facility for inspection and replacement of worn or deteriorated parts; facility for shipment by air, water, road, or rail of complete aircraft and spare parts, etc.;

(5) Characteristics peculiar to the service intended: Restrictions of all kinds; for example, there are often imperative requirements to use certain landing fields, shops, hangars, structural parts, special materials already on hand, or the obligation to consider contracts or commitments which cannot be broken, or to follow existing standards established for older types of aircraft, material or installations.

The preceding outline of the problem is enough to show how delicate and difficult the arrival at a good compromise must be, and likewise how easy it must always be for prejudiced or ill-informed critics to condemn this compromise by considering only certain aspects of such a complex question with so many requirements and restrictions, many of them conflicting. It can be seen also, by the number and diversity of characteristics to be realized simultaneously to a greater or less degree for each, how wide a field aeronautical science must and can cover, embracing as it does the application to aeronautics and aircraft of engineering in its broadest aspects.

The scientific methods applied in aeronautics are so complex and broad that aerotechnics is often applied as a name for one part only of the subject: the application of aerodynamics to aircraft design, which is really the most highly specialized and characteristic part of aeronautical engineering. Nevertheless, there is a special technique required for every characteristic named above, and specially for the structural design (use of special materials), economic and military characteristics (design and installation of special engines, special armament, and special apparatus); and even the special restrictions for the service require specialized knowledge and methods of analysis.

Therefore, as aircraft are distinguished by their flying ability, airworthiness and performance, it is appropriate that aerotechnics should be applied principally (but not exclusively) to the attainment of these flight characteristics and that we shall here give special consideration to the dynamics of flying machines. The scope of this popular article, further-

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* Opening address before the Technical Session of the International Congress for Aerial Navigation, under the title: "L'Aerotechnique et le Probleme de la conception des Aeronefs." Also published in *L'Aeronautique*, Paris, Nov. 15, 1921.

† The word "aerotechnique" has no exact equivalent in accepted English, but is clear enough as embracing the technical arts of the aeronautical engineer.

‡ For example, German aeronautical designs have been frequently (and wrongly) compared with French designs, systematically attributing to the former superiority by considering only one side of the problem, or a part only of the compromise without bothering about the whole. It is not by taking only one or a few of the possible points of view that a fair and comprehensive judgement can be made of so complicated an apparatus as an aircraft.

more, permits only a brief examination of the essentials of the subject.

The Flight Characteristics of Airplanes

Reviewing the list of flight characteristics, it appears that the technical problems connected with the realization of the desired characteristics would easily be solved by the aeronautical engineer provided he knew how to calculate or determine with sufficient precision for any contemplated conditions of flight or maneuvering the following:—

(a) Direction, magnitude and point of application of the resultant and principal components of the forces exerted by the air, supposed initially calm, upon the complete aircraft and upon each of its principal parts;

(b) The thrust actually given by each propeller in calm air;

(c) The influence of rough air on the forces and reactions just named.

The first essential characteristics to calculate or determine, the flight characteristics, are of the same nature as those which are fundamental in ship design: seaworthiness, speed and buoyancy, but with this difference. The phenomena of hydrodynamics concerned in ship propulsion, stability and buoyancy in smooth or rough water are much better understood than the analogous aerodynamic phenomena relative to aircraft. Also, the difference is magnified by the fact that the amplitude of the possible movements of an aircraft in the vertical plane are infinitely greater than those of the most lively vessel.

Nevertheless, in order to have any aerodynamical data for use in the design of an aircraft just as is the case for hydrodynamical data for use in the design of a vessel, one must either *calculate directly* by means of algebraic formulae based on pure reason where the theoretical coefficients are given empirical values deduced from past experience, or one must learn *by experimentation* with a small model or with another aircraft of the same type (either larger or smaller) already built. Suitable rules of comparison permit the application to the design of results determined experimentally on the model or the type aircraft.

In view of the fact that to date no adequate theory of the motion of bodies in still or disturbed fluid has been demonstrated, the use of theoretical formulae corrected empirically either for aircraft or vessels, and especially for the former, can give no comprehensive or exact solution. Consequently, formulae based on such theory as exists or curves derived therefrom can be used only for the first rough approximations of preliminary design. The value of such a method is not negligible, but it is necessary to base important designs almost exclusively upon experiments with a model made to reduced scale, or upon experiments with a similar type of aircraft already in existence, applying a theory of comparison. For this reason the question of the relation between model and full scale results, as well as correspondence between actual aircraft of different forms should have a prominent place in the discussions of the *Commission technique* of this first *Congrès international de l'Aéronautique.*

The joint labors of the *Commission technique* will be of the greatest interest as it is well understood that the essential problem of aeronauties is this fundamental one of aerodynamic similitude, a problem as yet not really solved in spite of the efforts of the most able scientists and engineers of the world.

Sources of Error in Wind Tunnel Tests

With regard to experiments with models in wind tunnel and the use of the theory of mechanical similitude to predict from the models the properties of the aircraft, or part which the models represent, there are still many sources of error:—

(A) In a wind tunnel, the air is blown upon the model at rest, while in reality, the aircraft moves through still air.

(B) The current of air in the wind tunnel where the model is tested is not always as steady and free from turbulence as one could wish; in any case, the current of air is of relatively restricted dimensions while aircraft must be considered as flying in a relatively unlimited medium and the influence of the boundary (the surface of the ground for example) is of no concern except for very special cases, such as starting or landing.

(C) Due to the small size of the model, it is very difficult to obtain true geometrical similarity to the coresponding aircraft.

(D) A model has to be supported in the wind tunnel by braces which disturb the air (depending on the nature of the supports), and this effect is not always measured with sufficient precision.

(E) Because of differences between the action of the air in the two cases to be compared, and because of the lack of precise knowledge of the motion of air disturbed by a moving body, one cannot assert that mechanical similitude between model and full scale is truly realized in the relative motion of the air past the model, and past the full-scale body.

In establishing a basis for comparing actual airplanes by application of the theory of mechanical similitude, while one may eliminate the sources of error, A, B, and D, and likewise C, by having the ratio of geometrical similitude very near unity, yet the source of E must still be considered as we do not know the possible departure from similitude of the wave motion created in the air and the forces resulting from such motion.

In the intermediate case where a relatively large model is used, not fixed in an air stream but driven through the air on an *aerodynamic carriage* on rails, the sources of error must be classed between those inherent in the wind tunnel method and those residual in the method of comparison with actual airplanes.

Regardless of the experimental method followed, similitude is not exact, and it is very important, while perfecting the experimental technique, to know how to correct the results of experiment to allow for any defect in similitude between the proposed design and its model, or any other aircraft with which the design is compared.

It may be said that on this subject we are very close to a sure and precise solution in France, thanks to a methodical series of experiments conducted for several months past simultaneously on:—

(1) Models of airplanes in a wind tunnel,
(2) Models of large scale on an aerodynamic carriage,
(3) The corresponding actual airplanes in gliding flight.

The results already obtained are such that one may expect to have available very shortly for use in preliminary design perfected rules of aerodynamical comparison which will be at least as precise as those which have long been used in ship design to determine the under-water form by rules of mechanical and hydrodynamical similitude.

This first essential point granted, there remains the very interesting research to determine the laws governing the turbulence and wavelike movements characteristic of the atmosphere, as well as their effect on the flight of aircraft. While the similar problem is approximately solved for the disturbed motion of the sea in its effect on ships, the motion of the atmosphere and its effect on aerial navigation will be much more difficult to treat. But it is necessary to attack with resolution and courage if we are ever to attain true soaring flight or to equal the efficiency of certain birds.

While we are nowhere near a solution, that is no reason to be discouraged. Safe vessels were built long before the laws and action of the sea were understood, and perfectly sound aircraft with all provision for safe flight have been made for some time in spite of almost complete ignorance of the nature of rough air.

But while practice precedes science, in this as in many other activities, science will have the last word and will explain and complete the "how" with the "why," so necessary to the perfection of any human conception.

Fast Flight in Loening Air Yacht

Ross K. Judson, President of Continental Motors of Detroit, left Port Washington, Long Island, in his Loening Air Yacht, on August 31, for Lake George, New York, with Harold Kantner as pilot. Mr. Judson's final destination is Detroit, where he will use his air yacht for business and pleasure purposes, and which he expects to reach via the Great Lakes. Latest advices are to the effect that Mr. Judson's Loening air yacht covered the distance between Port Washington and Montreal, P. Q. in 4 hr. actual flying time.

The Army Airship Shed at Belleville, Ill.

Huge Building, Now Under Construction, To Be 923 ft. Long, 206 ft. Wide and 170 ft. High

The Army's contractor, the W. M. Sutherland Bldg. & Contr. Co. is making rapid progress on what is believed to be the most advanced type of airship shed yet constructed. Maj. F. M. Kennedy has had charge of the Air Service share in the job while the designing and construction is credited to the Office of the Quartermaster General. Capt. Carl H. Jabelonsky, Q.M.C., represents the Q. M. General in the supervision of construction.

Scott Field near Belleville, Ill., is an Air Service operating station and is naturally one of the mid-points on transcontinental airship routes, whether military or civil. The new shed stands about in the center of the square mile of land comprising the post and on the north-east and south-west diagonals, this location having been selected after a study of meteorological records.

Great Advance in Design

The structure has many new features and represents the greatest advance to date in airship shed design. It measures over all 206 ft. 6 in. wide, 170 ft. high and 923 ft. long. The inside clearance is 150 by 150 by 810 ft. In addition, docking rails extend 1400 ft. beyond the shed in each longitudinal direction.

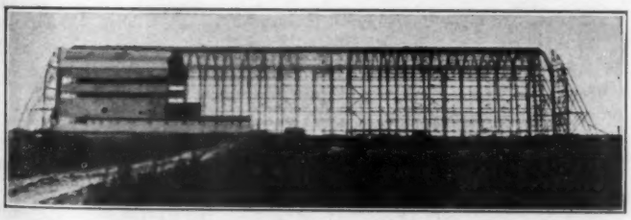
Adjacent to the shed is a boiler house for heating the enclosed rooms of the shed, a steel gas holder of 500,000 cu. ft capacity and a hydrogen gas generating plant. A bituminous macadam road has been built from the main roadway to the shed. Storm and sanitary sewers, and fire protection systems are provided. It is believed that this is one of the best drained fields ever built.

The framework is of the three-hinge arch truss type, a typical design, the trusses being carried on steel "A" frames 50 ft. high.

The side walls and doors are covered with aluminum coated corrugated asbestos protected metal, this coating being for the purpose of deflecting heat from the sun's rays.

The roof is covered with cement tile, the skylight glass being cast in the tile. This glass is imbedded in an asphalt cushion to prevent cracking from expansion and contraction.

On each side of the building are two rows of skylights, 2 rows of steel fixed sash and 2 lower rows of movable sash.



View of hangar nearly half a mile distant

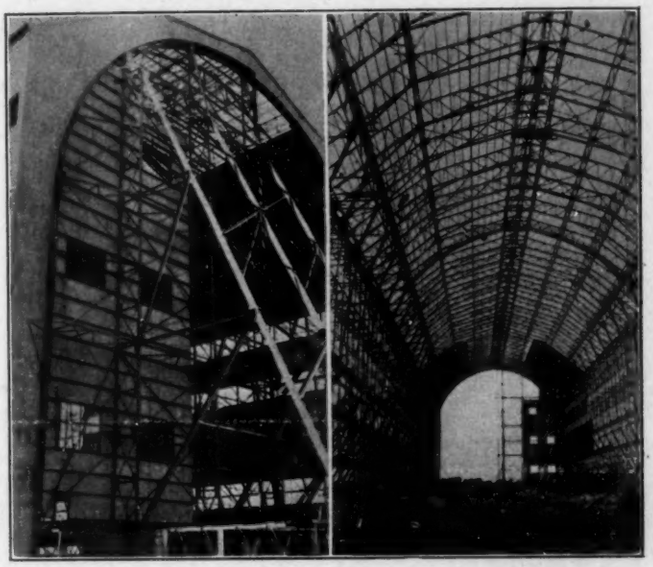
All glass is quarter-inch ribbed actinic (brown) wired to cut down the effect of the sun's rays on the envelope of the airships inside and at the same time provide the maximum amount of illumination during the day time. The actinic glass absorbs the ultra violet rays and some of the infra-red rays of sunlight, which would be injurious to the airship envelope and tend to rot the rubber.

Ventilation is through twenty-five ball bearing 48-in. rotary ventilators along the peak of the roof. These have a drawing capacity of 400,000 cu. ft. of air per hour each.

At each end of the roof is constructed an observation tower 7 x 14 ft., with a 4-ft. platform all around. Each observation tower is equipped with a 36-in. searchlight for signal purposes and to assist in landing airships at night.

The enormous doors at each end of the shed attract special attention because of the engineering difficulties. The doors are distinctly of American design and are a radical departure from the German type in that they are counterbalanced against wind pressure instead of being of the overhead-hung type. This system gets rid of a large amount of overhead steel work and increases the height of the opening in the building by more than 15 per cent over that in German sheds.

Each door leaf is 75 ft. wide and 150 ft. high and is carried on a steel platform. This platform is supported by six 6-



North door end and interior looking north

wheel trucks, with standard sanding device, travelling on two railroad tracks of standard gage. Cast steel blocks are used in place of springs. Two of the trucks for each leaf have wire rail brushes. The total load per truck is 205,600 lb.

Each corner truck is equipped with a 20 hp. electric motor, completely enclosed to prevent sparking, driving through spur gearing two pairs of wheels of each corner truck. The four motors per leaf are 220 volt d.c. Westinghouse, designed for 100 per cent momentary overload and 25 per cent continuous overload.

Each door leaf carries a control house, in which is installed a protective panel, master switch, two master push buttons. Immediately outside each control house is installed a tank containing magnetic reversing control and cabinet containing four sets of starting resistance. This control equipment is suitable for controlling the four series-wound, direct-current motors of 20 hp. each in parallel for opening and closing the doors, for controlling the four solenoid brakes mounted on the motors and for controlling the limit switches and arranged to provide for load and low voltage protection. All contacts productive of sparking are oil immersed to prevent ignition of gas.

The motors are synchronized and are protected by interlocking switches so that inexperienced personnel can not operate the doors in such a manner as to cause injury either to themselves or to the mechanism of the shed.

The brakes automatically function the instant electric power is shut off the motors and continue to hold until the current is thrown back.

The doors are required to open at a speed of 10 ft. a minute. In the case of failure of the electric power, or of the mechanism, the doors are capable of being opened manually after sliding out of mesh a pinion of the gear drive. The hand de-

vice consists of two steel drums and cables. One end of the cable is secured to the drum and the other end to the bottom of the steel frame when doors are in closed position. The drums are secured to the side of the steel door frame and operated by a capstan through shafts and bevel gearing.

To close the door manually will require approximately 45 min., a rate of about a foot a minute.

Between the doors is a large air compression piston to take up the jar when the doors meet. A similar Westinghouse air cylinder and striker block is installed on the outside of each door to operate against concrete bumpers at the end of the door rails to stop the door from over-travelling in the event of too much momentum. The door rails allow for 75 ft. movement of the door leaves.

Docking Rails

Docking rails of the slot type, spaced 137 ft. apart and laid in concrete, are provided on each side of the hangar, approximately 6½ ft. from the inside clearance of the door. These run the full length inside the shed and for 1400 ft. outside, with manholes at each end and spaced every 150 ft. of their length.

Eight trolleys run in these docking rails. These consist of a frame holding two vertical wheels which run against the upper inside surface of the rail and four more bearing wheels running against the side of the rail, and a towing link exposed above, with quick release device mounted thereon.

When docking rails are used in housing a ship—for instance, in the event of a cross wind—the airship is brought to a position where the nose is over the rails, when lines are dropped from each side of the bow to the trolleys. Then stern lines are taken off and attached to additional trolleys or carriers. These rear lines are gradually taken up until the aircraft is pulled over to a position parallel with the rails and then moved forward into the shed, the rail carriers being moved forward simultaneously by command.

The size of the shed and the docking rail system permit the largest airship yet projected to enter this building with ease; or it will house a number of blimps.

A very clever design has been worked out to permit the cross-over of the railroad track and the docking rails to function without interfering with each other.

The interior of the hangar is provided with a trench 3 ft. square, running down the center of the building, with a manhole every 30 ft. The trench contains a 10-in. steel pipe to carry hydrogen or helium gas; and two 2-in. pipes for compressed air and water respectively. Gasoline is brought in through special pipes through the side of the building to prevent fire hazard.

Buildings in A- frames

On each side of the building in the A-frames are eight small buildings, 22 ft. wide, 15½ ft. high and 60 ft. long. The 16 rooms comprising these are gas tight and are for use as offices, instrument rooms, storage, toilets, lockers, repair and machine shops, woodworking motor room, switch room, meter room, etc.

The switchboard room is so arranged that it can be entered only from outside of the building and is, of course, absolutely gas tight. It will be impossible here for any hydrogen gas explosion to take place from any electric sparking. All couplings and junction boxes anywhere are treated to make gas tight joints.

Fire protection is provided by hose reels at the corner of each room. Eight fire hydrants are properly distributed along the outside of the building with a pressure water system.

Illumination of the building at night is by one row of 200 watt lamps every 30 ft., the light being reflected down from the walkway in the center of the roof. On each side are three more similar rows of lights. These have vapor proof glass globes with shallow bowl steel porcelain enamel reflectors. In the lower tier, 15 ft. above the floor, there are located every 30 ft. 200 watt searchlight projectors, arranged so that they can be elevated or depressed 90 deg. and turned horizontally 360 deg. Above the walkway in the center of the roof is a row of 40 watt lamps on drop cords.

All lights are arranged in groups of three so that only the necessary area may be lighted. However, all lights may be turned on at one time from the four switchboard rooms, located two on each side of the building.

The floor of the building, sloped to provide drainage, is of 4 in. concrete covered with a 1-in. asphalt mastic compound for the purpose of providing an acid proof and a spark proof floor.

The weight of the entire structure is carried on piers under each column, 7 ft. deep and 7 x 15 ft. in section.

At about the top of the vertical side walls, running each along each side of the shed the full length, are walkways, reached by stairways. At three points stairs run up to the walkway running along the center of the roof.

New Aircraft Manufacturing Corporation

The Baldwin Aircraft Corp., a new concern in the field, announces that it has taken over the well equipped plant and other manufacturing facilities of the Ordnance Engineering Corp. and is now in a position to execute orders for aircraft, aircraft parts and for any class of machine shop, sheet metal and wood work.

The plant is located in the center of an established aircraft community about one hundred feet from the Baldwin Station

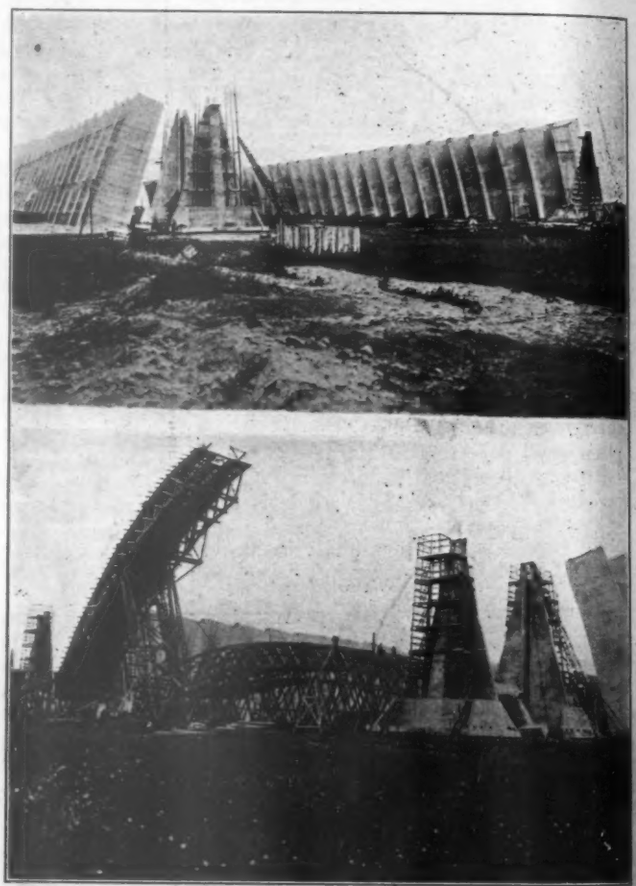


Photo Kadel & Herbert

Construction work at Orly airport, the new air station near Paris, France

on the Montauk Division of the Long Island R. R. and may be reached in forty-five minutes from New York City. In addition to having an excellent railroad location the plane is at the junction of two highways and about midway between Mineola and Far Rockaway, consequently both land and water machines can be conveniently received and delivered by air.

William F. Bennett, formerly secretary and treasurer of the Lewis and Vought Corp., is president of the Baldwin Aircraft Corp. and John J. Rooney, recently engineer and production manager of the Chance Vought Corp., is general manager.

That Reversible Airplane

Editor, AVIATION,

While looking through the July 3 number of AVIATION I was very much interested to find John B. Flowers' article on a reversible or backward-flying type of airplane, and I read the article and it's appended discussion with much interest.

A somewhat similar idea came to me over a year ago, during a lecture hour one warm spring morning in my senior year in college. Fundamentally, my plan calls for fuselage, undercarriage, motor and propellor, main supporting surfaces, control and auxiliary surfaces, and means of manual operation of control surfaces. For normal flight, the machine appears and is very much as a standard present day type, but the features which permit (?) backward flight are as follows:

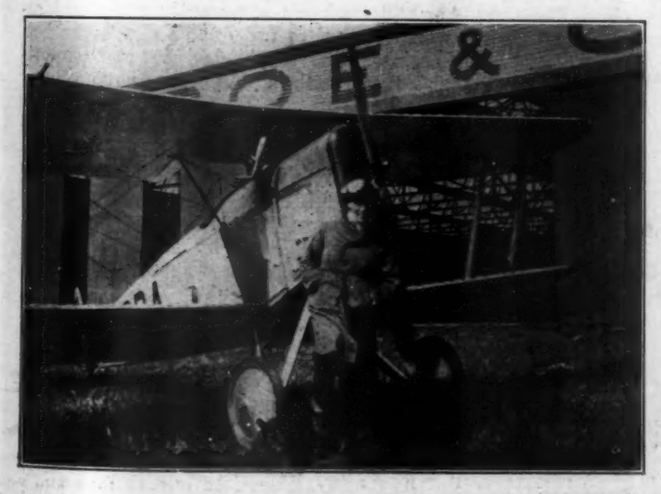
1. The propeller is reversible.
2. The main surfaces have a compound curve which will function fairly efficiently whichever end is used for the entering edge,
3. The control and auxiliary surfaces are balanced, the rudder and vertical fin being one unit surface and the elevators and horizontal fin being another unit surface, and each surface is to be capable of being *completely reversed* so that the proper condition of balance and ease of operation is preserved for backward flight,
4. Exterior wing-tip ailerons are used,
5. A central skid is used with the wheeled undercarriage, to be used chiefly for reversed landings,
6. Tail skid effective in either direction of motion,
7. Reversible cockpit, and either reversible or double controls.

Briefly, my plan calls for a tractor machine for forward flight, with means to convert to a tail-first type for backward flight. There is no complexity of fuselage as with Mr. Flowers' suggested type, and a clearer view for the pilot is provided. The reversing of the control surfaces could take place in the instant before backward flight begins, and when the movement would not disturb the machine materially.

Of course, there are many details which would have to be worked out, such as the reversible propeller and the control surface reversing gear, the reversible cockpit and control, undercarriage location and design, and the complicated series of aerodynamic design problems involved. The ideas incorporated in the machine are radical, but so also are the demands imposed when such a type of airplane is called for.

HENRY W. FISH
Portland, Ore., July 17, 1922

From London to Moscow



New Avro Baby on which the Russian pilot Gwaiter recently made the first flight from London, England, to Moscow, Russia. The pilot was held up for a time when crossing Germany, where the presence of a Russian in a British aircraft caused complications

Air Distance Recorder

It is estimated by the Aeronautical Chamber of Commerce that civilian aircraft in the United States flew last year a total of approximately 9,500,000 miles.

"Estimated" and "approximately" because very few of the owners of airplanes were able to give anything like an accurate statement of the distance their planes had flown. It was too much trouble to keep an accurate record of the time of take-off and time of landing of each flight, figure the elapsed time, multiply by the estimated average air speed, and finally arrive at the distance flown. But even those who took this trouble could report only "estimated" distances, because of the errors in their air speed figures.

In order to have a record of the performance of his ship, a conscientious pilot keeps a "log": noting the time of take off and landing of every flight, figuring the elapsed time, and totaling, day by day, the flying time. To arrive at the distance he has flown the best he can do is to multiply his hours by the estimated average air-speed— giving a result which is in most cases so far from correct that reliable performance figures cannot be based upon it. And to maintain this record either the pilot or his mechanic has to do a large amount of disagreeable clerical work. For this reason the log is in many cases only approximately correct.

It is for the purpose of eliminating all of this book-keeping and inaccuracy that the Pioneer Instrument Co. of Brooklyn, N. Y., has just placed on the market the Pioneer Air Distance Recorder. A small propeller revolves as the plane goes forward, once a mile actuating a valve which admits vacuum, created by a small but powerful Venturi tube, to an indicator on the instrument board, adding one mile to the recorded distance.

The accuracy of the Pioneer Air Distance Recorder, when properly installed, is within a fraction of one per-cent for all flying speeds and for altitudes up to 20,000 ft. The combined weight of the transmitter and indicator is less than two pounds, and the head-resistance of the transmitter is practically negligible.

If a trip or daily record is wanted this may be noted from the "trip" indicator which is then set back to zero. The "season" mileage gives a continuous record of the performance of the ship.

This provides a real basis for all calculations and records: fuel and oil consumption, actual air speed, service between overhauls, costs per passenger or per ton-mile, relative financial return from different ships per mile flown, etc.

The Air Distance Recorder is also invaluable as a navigating instrument for the pilot flying over unfamiliar country, or in weather which more or less obscures his land-marks. By making allowance for the wind, which can be done with a simple ground observation, it is possible to bring a ship down pretty close to a desired field, even under most unfavorable conditions. On such a flight a reliable compass is of course necessary, and proper allowance must be made for drift.

Notice to Aviators

A license has been issued by the Air Board of Canada establishing an air harbor at Esquimalt, Vancouver Island, British Columbia, and mariners are cautioned that for lighting and taking off seaplanes will use an area one-half mile square bounded as follows:

On the north by a line drawn from the southern part of Patterson Point, western side of Esquimalt Harbor, 90°, for a distance of one-half mile, to a point about 180 yd. eastward of Dyke Point, thence 180° to the extreme southwest point of Ashe Head, thence 270° to a point about 60 yd. from high-water mark at Rose Bank, thence 0° to the point of departure.

No special signals have yet been provided in connection with this station but the hangar is situated about 100 ft. northward of Inskip Island.

It is pointed out that seaplanes while at anchor or navigating on the surface of the water shall be subject to the same regulations as ordinary surface craft.

Transcontinental Airship Flight

The first transcontinental airship flight ever attempted in this country was started 35 min. after midnight on Sept. 13, when the Army Airship C2, commander Maj. H. A. Strauss, arose from Langley Field, Hampton, Va., bound for Ross Field, Arcadia, Calif. Capt. George A. McEntire is second in command. The other officers and crew are as follows: Lieut. O. A. Anderson, Lieut. Don. L. Hutchins, Master Sergt. Wm. E. Fitch and Staff Sergt A. D. Albrecht, Engineers.

The route to Ross Field as scheduled passes over Washington, D. C.; Akron, Ohio; McCook Field, Dayton, Ohio; Scott Field, Belleville, Ill.; Camp Pike, Little Rock, Ark.; Love Field, Dallas, Tex.; Brooks Field, San Antonio, Tex.; Marfa, Tex.; Camp Bierne, El Paso, Tex. and Yuma, Ariz.

The C2 is 192 ft. long, 54 ft. wide, 57 ft. high, and has a capacity of 172,000 cu. ft. of hydrogen. Two 150 hp. Wright motors propell the craft at about 65 m.p.h. Its ceiling is about 8500 ft.

The first leg of the flight, from Langley Field to Wingfoot Lake Air Station, near Akron, a distance of about 400 miles was made in 10 hr. 50 min., the C2 arriving at the Akron balloon field at 11.25 a. m.

The following two days the ship reached in easy stages Dayton, Ohio, and Scott Field, near St. Louis, Mo. On Sept. 17 the C2 made the longest leg of its transcontinental trip by covering the 850 miles separating St. Louis from Brooks Field, San Antonio, Tex., in a night flight of 16 hr. 20 min. Rough weather was encountered on this leg and an error of altitude on the map used for the flight in respect to one of the peaks of the Ozark Mountains came near causing disaster. The peak was higher than indicated and the C2, speeding through the darkness, was almost upon it before it was sighted and the helmsman jerked the ship up, just clearing the peak.

Air Mail Service Commended

The National Advisory Committee for Aeronautics sent the following resolution to Postmaster General Work on Sept. 5:

"RESOLVED, That the National Advisory Committee for Aeronautics notes with gratification the excellent performance of the Air Mail Service in completing a year's operation, along difficult routes and in all conditions of weather, without a single fatal accident.

"RESOLVED FURTHER, That the National Advisory Committee for Aeronautics extends its congratulations to the Postmaster General, and through him to the Second Assistant Postmaster General and the entire personnel of the Air Mail Service. This performance denotes substantial progress in the practical application of airplanes to the purposes of commerce and other peaceful pursuits. The National Advisory Committee for Aeronautics expresses the hope that the performance of the Air Mail Service will serve to inspire public confidence in the safety and utility of airplane transportation under competent management and control."

British Prizes for Sailplanes

The London *Daily Mail* has announced that it is offering a prize of £1,000, open to aviators of any nationality, for the longest flight made on an engineless glider in England between Oct. 16 and 21, next. The prize will be won by the competitor who, rising from a specified area, remains longest in the air, provided the flight occupies not less than 30 min. All flights must be commenced between sunrise and sunset. The competition will be conducted by the Royal Aero Club.

The *Daily Mail* also announced that it is offering a prize of £5,000 for a sailplane competition to be held next year.

As a further indication of the interest soaring flight is eliciting in Great Britain may be mentioned a sailplane design competition open to all irrespective of nationality which *Flight* is organizing. Details of this competition which will close on Nov. 30, next, may be found in the Aug. 31, 1922, issue of our London contemporary.

"Hochdecker" and "Tiefdecker"

In a recent editorial of AVIATION dealing with the new Junkers monoplane the statement was made that "Professor Junkers, who was the originator of what the Germans call a *Tiefdecker*, or low-wing machine, thus apparently joins the ranks of those who see the proper solution of the cantilever monoplane in the *Hochdecker* (high-wing machine) originated by Anthony Fokker."

In connection with statement we are in receipt of a letter by Temple N. Joyce, of Baltimore, Md., in which he says among others: "If I am correct, and you can determine this by the evidence which I am sending under separate cover, I must take issue with this statement. It may be taken in two ways, either of which I can dispute. If it is meant that Fokker was the originator of the thick wing cantilever monoplane, then I call attention to the pictures on p. 73 of *L'Aérophile* of March, 1921, which portrays an Antoinette built in 1911, which supersedes the construction of any Fokker. If the statement was meant to imply that Fokker was the originator of the *Hochdecker*, or high-wing machine, then I would like you to read the article on p. 41 of *L'Aérophile* of February, 1916."

The pictures and the article referred to by Mr. Joyce leave not the slightest doubt that neither Prof. Junkers nor Mr. Fokker originated the cantilever monoplane—a fact with which we were familiar, although it was not expressly stated in the editorial in question. There can be no question that the first cantilever monoplane in the world was built in 1911 by Leon Levavasseur, the brilliant French designer of the early Antoinette monoplanes and of the engines of the same name. It is equally established beyond any doubt that the first "raised-wing" monoplane was brought out a few months before the war by the Morane-Saulnier firm of France, which named this type of machine a "parasol" monoplane.

Our editorial, however, never meant to put in doubt these historical facts. In referring to Prof. Junkers as the originator of the low-wing machine, we merely intended to give the German constructor credit for having been the first to produce a modern *cabin* airplane with low wings. The same remark applies to the case of the Fokker *Hochdecker*, although as a matter of fact the Germans differentiate between this type, in which the wing is flush with the top of the fuselage, and the "raised-wing" type originated by Morane-Saulnier (in which the wing is raised above the top of the fuselage) by calling the latter a *Parasol-Eindecker*, and not a *Hochdecker*.

Brak-Papa on Fiat Makes 208.5 m.p.h.

Brak-Papa, the well-known test pilot of the Fiat firm of Milan, Italy, on Aug. 29 made an apparently successful attempt to beat the world's speed record of 205 m.p.h., held at present by Sadi-Lecointe, who established in a Nieuport-Delage "Sesquiplane" fitted with a 300 hp. Hispano-Suiza engine.

Flying a Fiat racing biplane fitted with a 700 hp. Fiat engine, Brak-Papa covered, in accordance with F.A.I. regulations, a 1-kilometer course twice in each direction, attaining a speed of 208.5 m.p.h. His times for the four laps were: first, 10.9 sec.; second 10.3 sec.; third, 11.3 sec.; fourth 10.4 sec. This record has to be homologated by the F.A.I. before it will officially stand as the world's new speed record.

World Flight Abandoned

The round-the-world flight of Major Blake has been abandoned according to notices appearing in our English contemporaries. After reaching Calcutta, India, where Major Blake was taken ill with appendicitis and had to forego his trip, his two companions, Captain Macmillan and Captain Malins, pushed on to Akyab in a Fairey seaplane. Engine trouble developed, however, en route, and the machine was forced to alight on a rough sea, where it capsized. The fliers drifted in the up-turned seaplane until the following day when they were rescued near shore by a motorboat.

Aviation in Congress

June 3—July 11, 1922

June 10. *House*
Mr. Hicks: a bill (H.R. 11983) authorizing the acquisition of certain sites for naval stations, to the Committee on Naval aviation.

June 12. *Senate*
Mr. Heflin: joint res. (S.J. 207) to prevent airplanes from disturbing public assemblies in the District of Columbia. Resolution was objected to by Senator Williams. Laid on the table.

June 15. *Senate*
Mr. Poindexter in reporting the navy bill (H.R. 11228) stated that the Committee approved of an appropriation of $6,500,000 for new aircraft and $300,000 for construction of stations.

June 16. *Senate*
Amendment providing $6,500,000 for new aircraft and $300,000 for construction of air stations passed Senate.
Notification that President Harding had signed the Executive and Independent office appropriation bill (H.R. 9981). This bill carries an appropriation of $210,000 for the National Advisory Committee of Aeronautics.
Mr. Walsh speaks for the amendment providing for the retention of 50 Naval reserve aviators. Agreed to. Senator Walsh speaks very strongly against line officer examinations for naval aviators.

June 17. *Senate*
Remarks in the Senate by Mr. Walsh relative to rating of certain naval aviator officers who were commissioned in the line of the Navy at reduced rate.

June 19. *Senate*
Senator Walsh's article on aviation printed in the N. Y. *Times* printed in the record. Article is of general interest—urges a separate air service.

June 23. *House*
Deficiency estimate. Vice President laid before the Senate communication from the President (S. Doc. No. 214) transmitting an estimate of appropriation for the War Department, fiscal year, 1921, for the acquisition of certain parcels of land contiguous to aviation fields, $22,759; to Committee on appropriations.

June 27. *House*
Mr. Kelly of Michigan explained in the House that the additional $7,500,000 carried in the Navy Bill for ship construction was necessary because of the conversion of two battle cruisers into airplane carriers.
Amendment allowing $6,500,000 for new airplane construction and $300,000 for construction of air stations passed the house.

June 28. *Senate*
Remarks in the Senate by Mr. Walsh relative to the rating of certain naval aviator officers who were commissioned in the line of the Navy at reduced rates.
Army bill (H.R. 10871) signed and presented to President. A total of $12,895,000 appropriated for the army air service.

June 30. *House*
Navy bill (H.R. 11228) signed and presented to President. Bill appropriated $14,803,660 for aviators.
Senate
Senate passed H.R. 11214 a bill which provides for the scrapping of certain vessels in conformity with the Naval Treaty. Provides for the conversion of 2 battle cruisers into aircraft carriers.

July 6. *Senate*
Polar flight plans of Edwin Fairfax Naulty inserted in record. Letter from Naulty to Senator Robinson in which he explains his plans for the use of the airplane in this trip. Claims that Amundsen has appropriated his plans. Naulty's trip was to establish the claim of the United States to Wrangle Island. There are now on record two bills (H.R. 9576) and H.R. 11515) providing for the purchase of airplane patents of this Edwin Fairfax Naulty. Neither bill has ever been discussed in Congress.

Bid for Air Mail Depot

Bids for the construction of an airplane and assembly depot and two hangars at the Speedway field, Chicago are being advertised by the Post Office Department according to an announcement made Sept. 5.

The depot for mail planes which has been in operation for two years is on property surrendered by the Post Office Department. Permission has been granted to build on the Speedway park adjoining. The depot makes major repairs on damaged airplanes for all three divisions of the Air Mail Service. Besides this an average of eight remade planes are being assembled every month for use in the service or for storage at reserve stations.

The depot, which will have 58,100 sq. ft. of floor space will contain a warehouse, garage, test stand room, factory and assembly room. The building will be two stories high. The two hangars will be 100 ft. by 100 ft. The improvements will give the Air Mail Service altogether 78,100 sq. ft. of floor space. It is estimated that this increase in facilities will accomodate present needs and allow some expansion in the future at the central field of the trans-continental air mail service.

The Post Office Department through arrangement with the War Department receives DeHaviland planes which were made for war use. These are forwarded to the depot at Chicago where they are made over for use as air mail planes. The wings are recovered, the fuselage rebuilt and the steel undercarriage fitted. The front pit is made into a mail compartment.

The air mail depot started as a repair station has developed into an important feature of the service. Gradually a skilled group of artisans and cabinet makers have been brought together. They turn out planes which stand the stern tests of daily flying in all kinds of weather. It is the job of the airplane depot on the edge of Chicago to keep the equipment of the Air Mail Service in first class condition at all times.

Aeronautic Direction Instruments

N.A.C.A. Report No. 128

Report No. 128 of the National Advisory Committee for Aeronautics, in four parts, covers the general field of direction instruments.

Part I, points out the adequacy of a consideration of the steady state of gyroscopic motion as a basis for the discussion of displacements of a gyroscope mounted on an airplane, and develops the simple theory on this basis.

The principal types of gyroscopic inclinometers and stabilizers are briefly described and performance requirements stated.

Part II, deals briefly with the testing and use of magnetic compasses for airplanes.

Part III, contains a brief general treatment of the important features of construction of aircraft compasses, and descriptions of the principal types used in America and in foreign countries.

Part IV, gives a brief history of the development of airplane turn indicators, with detailed descriptions of all known types and makes. The results of laboratory and flight tests are given for the several available gyroscopic turn indicators.

A copy of Report No. 128 may be obtained upon request from the National Advisory Committee for Aeronautics, Washington, D. C.

Novel Sailplane

The constructors of one of the most successful machines used in connection with last year's soaring contest, the firm Segelflugzeugwerke, of Baden-Baden, after continuing the tests commenced on the Rhöen mountains, have brought out a new type of soaring machine which embodies some unusual features.

This machine, which is illustrated on the cover page, is a practically perfect cantilever machine with exceptionally slender wings, so designed as to allow—by virtue of a special distribution of lifts—a ratio of 1 : 12 to be adopted as the ratio of sides. The outline thus obtained is a faithful imitation of the wings of the big soaring sea birds, which could not so far be utilized in airplane construction. Tests at the Goettingen Aerodynamical Station showed the gliding factor to be most satisfactory. Moreover, the inherent stability of the machine was found to be remarkable, without in any way impairing the ease of turning.

When equipped with a small engine, this airplane will, it is believed, attain speeds otherwise entailing the use of engines many times more powerful. The new design will also enable a light-engine soaring machine, capable of landing anywhere, to be constructed, which in desert countries and in the colonies, should prove the ideal craft for aerial surveying and other applications requiring no excessive speeds.

The principal characteristics of the machine are as follows: 100 kg. net weight, 16 sq. m. area, 14.5 m. span, 3.5 m. length, 1.7 m. height.

A Letter from Wallace Kellett

Wallace Kellett, of Philadelphia, American representative of the firm of Farman Freres of Billancourt (Seine), France, the makers of the well known Farman "Goliath" and "Sport" airplanes, who is at present sojourning in France writes in a recent letter to the Aeronautical Chamber of Commerce of America:

"I flew up to Brussels in one of our Goliaths for the International Flying Meeting, June 24-27. About 150 machines took part. The organization was perfect, and the smooth way in which they conducted the meet was quite impressive. The different contests were in the hands of special committees, so that everything was perfectly controlled. The attendance was good, including the King himself. My main criticism would be that the military end was perhaps overdone. I think it is almost a good thing in the States, that we do not have so much government co-operation in a way.

"The air lines here are running regularly, but this season has produced quite a large amount of accidents, which have occurred mostly to the remodelled war machines still in use in some of the lines, mainly Paris, Strasbourg, Prague, Warsaw and Toulouse-Casablanca.

"Our Goliaths are now running to London, Brussels, Amsterdam and Lausanne, and they will be in service on the Paris-Warsaw line as soon as we can supply them, replacing the old ships. All our machines are either equipped or being equipped with wireless telephones with a range of 200 miles".

500 Civilians Learning to Fly

According to reports compiled by the Aeronautical Chamber of Commerce, approximately 500 persons are being taught to fly at the score or more of flying schools located in various parts of the United States.

Among the leaders in civilian flying instruction are New York, Chicago, Dayton, Ohio, San Francisco, and points in Missouri, Oklahoma, and Texas. Most significant returns are found in Dayton, Ohio, "The birthplace of the airplane," where at the field of the Dayton Wright Co. 4000 inquiries have been received this summer from civilians who are desirious of learning the requirements and cost of instruction in flight.

Value of Aerial Forest Patrol

The value of airplane forest patrol was forcibly demonstrated recently near Roseburg, Ore. One of the State Foresters in that city had received reports from the lookouts in his territory that there were no fires to be seen. It happened that just at that particular time he decided to accompany one of the Army Air Service pilots engaged in patrolling the Oregon forests. He had not proceeded very far on his aerial journey before he realized that the reports he had received from his lookouts were not as reliable as he was led to believe. To his great consternation he discovered that he had no less than twelve real fires on his hands which no one knew anything about. Needless to say, the State Forester is now converted to aerial forestry patrol for life.

The Wrong Kind of Protection

The interest air power elicits in Great Britain is well indicated by these cartoons from the London Evening News

"Going — going —"

John: "Can't you buy me an umbrella!"
Antique Collector: "If you knew how much we have just paid for these curios, you would'nt ask such fool questions!"

Some Umbrella!

"The Navy has only six fighting airplanes."—Mr. Avery in the House of Commons.

ARMY AND NAVY AIR NEWS

Air Service

Remarkable Transcontinental Flight—A remarkable transcontinental flight with only one intermediate stop was accomplished on Sept. 5 by Lieut. James H. Doolittle, A. S., when he flew in a special DH4 from Jacksonville, Fla., via Kelly Field, San Antonio, Tex., to Rockwell Field, Coronado, Calif. The pilot covered the 2275 intervening miles in 21 hr. 19 min. actual flying time, with a single stop at Kelly Field.

This was the second attempt of Lieutenant Doolittle to cross the continent with one intermediate stop. The first attempt, made on Aug. 6, last, after a record breaking non-stop flight from Kelly Field to Jacksonville, was prevented by an unavoidable accident. While attempting to take off from Pablo Beach, near Jacksonville, he encountered a soft spot in the sand, and was thrown into a "cheval de bois" (involuntary sharp turn on the ground), breaking the propeller and left wing of his plane. Undaunted by this misfortune, the pilot made ready for a second attempt and succeeded in a brilliant fashion.

Lieutenant Doolittle is a native of Alameda, Calif., where he was born on Dec. 14, 1896. He attended the University of California for three years and was a mining engineer for some time. His home is in Berkeley, Calif. Recently he has been stationed at Kelly Field, but has just been transferred to the Air Service Engineering School at McCook Field, for a special course in engineering.

When Lieutenant Pierson was lost in Mexico on his attempted transcontinental flight and was forced to abandon his plane, it was Lieutenant Doolittle who went into Mexico, had the engine repaired and finally flew the plane back to the States after it had been exposed to the weather for two or more months.

• • •

Air Service Officers Complete Advanced Flying Training—The following named officers and cadets of the 10th Group (School) Kelly Field, Tex., who began training with the Bombardment Group, have completed their advanced bombardment training at the Air Service Advanced Flying School: 1st Lieuts. Lyman P. Whitten, Clayton C. Shangraw, Alfred Clement, Jr., Ray H. Clark, and Flying Cadets Gilbert T. Baker, Thomas E. Halpin, Chester A. Potter and Albert C. Comdat.

• • •

Air Service Reserve Activities in Cleveland—The Organized Reserve Air Service in Cleveland, which has been assigned to the 84th Division, Air Service, has recently been transferred to the 306th Pursuit Group, of which one squadron and an Air Park are allocated to Cleveland and Cuyahoga County. Interest in the Reserve in Cleveland is rapidly growing, and it is expected that after the vacation season is over all units will be fully officered.

• • •

Air Service Trains Radio Operators—A new Army Radio School for training Air Service radio operators and electricians has been established at Chanute Field, Ill. The school was recently removed from Post Field, Okla., and new classes for radio instruction are being formed. It will be equipped with all the latest radio devices, including apparatus for aerial work in both heavier and lighter-than-air craft. Enlistments for training in radio for the Army Air Service are now being accepted at Chanute Field, where a six-months course will start within a few weeks.

Army Orders—First Lieut. Joseph W. Benson, A.S., Brooks Field, Tex.; to Scott Field, Ill.

First Lieut. William M. Lanagan, A.S., Aviation General Supply Depot, Morrison, Va.; to Langley Field, Va.

First Lieut. Clayton C. Shangraw, A.S., Kelly Field, Tex.; to Camp Alfred Vail, N. J., for instruction in advanced radio.

Capt. Earl Hamlin DeFord, Inf., Kelly Field, Tex.; transferred to Air Service Aug. 7, 1922.

Capt. John G. Colgan, A.S., Langley Field, Va.; to Fairfield Ohio, for duty with 88th Sqd. (Obs.).

Capt. Cassius H. Styles, A.S., Mitchel Field, L. I., N. Y., will report to Army retiring board, New York.

Maj. Harrison H. C. Richards, A.S., with Organized Reserves, 2d Corps Area, to O.C.A.S.

Sec. Lieut. Kenneth Francis Pughe, A. S., to Brooks Field, Tex., for flying training.

Maj. William J. Fitzmaurice, A.S., found by Army retiring board incapacitated for active service; retired.

First Lieut. Walter Raymond Peck, Inf., Kelly Field, Tex., transferred to Air Service Aug. 7, 1922.

First Lieut. Donald F. Stace, A.S., Carlstrom Field, Fla.; to Selfridge Field, Mich.

Maj. Charles C. Benedict, A.S., New York, to West Point Military Academy, Dept. of Tactics.

Relieved from duty at stations indicated and assigned to Langley Field, Va.:

Maj. Robert Coker, Curtiss Elmwood Air Reserve depot, Buffalo, N. Y.; Capt. Lynwood B. Jacobs, Capt. Ralph H. Wooten, Capt. Howard J. Houghland, Langley Field; Capt. Rosenham Beam, Camp Knox; Capt. Francis M. Brady, Mitchel Field; Capt. Albert M. Guidera, Capt. Frank O. Hunter, Selfridge Field; Capt. Edmund W. Hill, Capt. Hubert V. Hopkins, Capt. George S. Warren, Scott Field; Capt. Chilion E. Wheeler, McCook Field; Capt. George P. Johnson, Kelly Field.

Sec. Lieut. Hilbert Milton Wittkop, A.S., to Brooks Field, Tex., for flying training.

Lt. Col. John H. Howard, A.S., designated as commandant, Air Service Advanced Flying School, Kelly Field, Tex.

Maj. Ralph Royce, A.S., designated as commandant, Air Service Primary Flying School, Brooks Field, Tex.

• • •

Organization of the 49th Squadron—The detachment of the 14th Squadron, stationed at the Aberdeen Proving Grounds, Md., has been reorganized as the 49th Squadron (Bombardment). Privates Mussen, Williams, Foster, Carr, and Oatman, enlisted specialists, have been transferred to this new squadron from Langley Field. Lieutenants George, Melville and Bleakley made flights to Langley to arrange the transfer, which was effected by a Martin Bomber. The addition of these men was heartily welcomed by Aberdeen, as the force there had been very much weakened by discharges. Fields in this part of the country may know the new squadron by the gray wolf's head, which replaces the red lion.

• • •

An Extensive Mapping Trip—Lieutenants Hine and Webber, Air Service, returned to Rockwell Field on Aug. 7 from a 4000 mile mapping trip covering Las Vegas, Nev.; Denver, Colo.; Salt Lake City, Utah; Fort Sill, Okla.; San Antonio, Tex.; El Paso, Tex.; and Nogales, Ariz. The total flying time was approximately 39 hr., embracing 10 flights. This is considered to be remarkably good time, especially in view of the fact that they encountered bad weather between Las Vegas and Salt Lake City. Some interesting data on this flight is being compiled by these two officers.

Posthumous Honors—The Distinguished-Service Cross was posthumously awarded by the commanding general, American Expeditionary Forces, for extraordinary heroism in action in France to the following named officers and enlisted men who lost their lives in the service of the United States:

Charles W. Drew, first lieutenant, 13th Aero Squadron. For extraordinary heroism in action near Flirey, France, Aug. 15, 1918. Lieut. *Drew* operated one of a patrol of four machines which attacked four enemy battle planes. In the fight which followed he attacked in succession three of the enemy airships, driving one of them out of the battle. He then engaged another machine at close range and received ten bullets in his own plane, one of which penetrated his radiator, while another pierced his helmet. In spite of this he followed the German plane to a low altitude within the enemy's lines and shot it down in flames. During the latter part of the combat he courageously refused to abandon the fight, although he had become separated from his companions and his engine had become so hot because of the leak in his radiator that there was imminent danger of its failing him at any moment. He has since been killed in action.

Raymond C. Hill, first lieutenant, 146th Field Artillery, observer, 99th Aero Squadron, Air Service. For extraordinary heroism in action near Lachaussée, France, Sept. 13, 1918. He, with First Lieut. *Clarence C. Kable,* pilot, were directed to take photographs of the old Hindenburg line. They were accompanied by two protecting planes. After they had taken some photographs the protecting planes were driven off by hostile aircraft, but Lieut. *Hill* and his pilot continued on their mission alone, until in the vicinity of Lachaussée they were attacked by an enemy formation of nine planes. Putting up a gallant fight against these overwhelming odds, he was shot through the heart and killed, but his pilot, by his pluck, determination, skill, and courage, brought the photographs and the plane to our lines.

Fred W. Norton, first lieutenant, 27th Aero Squadron. For extraordinary heroism in action in the Toul sector, France, on July 2, 1918. Lieut. *Norton,* as flight commander led a patrol of eight machines, the first large American formation to encounter a large German patrol. His command gave battle to nine enemy battle planes driven by some of the leading aces of the German Army. Although both of his guns jammed at the beginning of the fight and were therefore useless, he stayed with the formation, skillfully maneuvering his machine to the best advantage. He was attacked by enemy planes at four different times, but skillfully avoided them or dived at them. His continued presence was a great moral help to his comrades, who destroyed two of the enemy planes. On July 23, 1918, this officer died of wounds received in action July 20, 1918.

Paul J. O'Donnell, second lieutenant, Infantry, 96th Aero Squadron. For extraordinary heroism in action near Dun-sur-Meuse, France, Sept. 26, 1918. His formation was attacked while flying to bomb Dun-sur-Meuse by seven enemy planes. With the first spurt of enemy fire he was fatally wounded. With his last strength he opened a deliberate and destructive fire on one of the enemy planes, driving it down out of control. He died before his antagonist struck the ground.

Naval Aviation

Bert Acosta Joins Naval Reserve Force—Bert Acosta, one of the most experienced pilots in American aviation was sworn in as a lieutenant in the U. S. Naval Reserve Force at the Navy Department on Sept. 8.

Acosta is reckoned as one of the pioneers in American aeronautics having first learned to fly in San Diego, Calif., in 1910. From that time until 1915 he was connected with Glenn H. Curtiss on development work of aircraft. In 1915 he became chief instructor of flying at Hazelhurst Field, Mineola, L. I., and was later transferred to the Technical Section of the Aircraft Production Board of the Army Air Service, at Wilbur Wright Field, Dayton, Ohio. At the outbreak of the war, Acosta applied for a commission in the Army but was kept on a civilian status as Director of Flying and Testing and Advisory Engineer on Construction as it was determined that in this capacity he could best serve the interests of the country during the war emergency. Acosta tested all planes for the Army which were accepted as military types during the war. In September, 1918, he was commissioned a captain in the Army Air Service and from then on he served in this commission until the Armistice.

Since the Armistice, Acosta has been test pilot and advisory engineer for the several large airplane building corporations. He has been connected with the development and flying of all high speed planes in this country and holds the world's record for a closed circuit, made in the Pulitzer Race of 1921 in the Curtiss-Navy Racer. Acosta has about 7000 hr. in the air and has flown every type of foreign and American plane with a record of only two damaging forced landings.

• • •

Night Landing Indicator at Anacostia—As a guide to aviators in making a landing by night, a luminous ground wind indicator has been installed on top of the hangar at the Naval Air Station, Anacostia, and recent tests have proven the new device to be of inestimable benefit to night fliers. The indicator resembles in appearance the familiar weather vane by day but at darkness it is illuminated so as to give the pilot about to make a landing, accurate information as to the direction of the wind.

The indicator is equipped with red and green lights. The red light is placed on the instrument in the position that corresponds to the arrowhead of the weather vane, while the green light is placed where the feathers of the weather vane arrow are located. As the indicator swings to the wind the red light appears up wind with relation to the green light. Tests made with the instrument have proven its value to pilots flying at altitudes from 1000 to 2000 ft. and it has been successfully used for night landings in the Anacostia River.

• • •

Hampton Roads Naval Air Station—Work on the completion of the airplane carrier Langley is reported to be progressing rapidly. Recently she left the Norfolk Navy Yard for Hampton Roads where she will try-out her special apparatus.

The Navy Yard Force recently completed the adjustment of her electric drive equipment which was remodelled from the old Jupiter. The arresting gear and plane-launching catapults, mounted on her spacious decks, have been practically completed; electric wiring and radio installation received their final touches a few days ago and are now ready for test. A final cleaning and a fresh coat of paint were given by the crew of the vessel.

During the past week aviation activities consisted of twenty-four test and precision flights. The air equipment consists of four Voughts, three Aeromarines and one DH4. A triple float Aeromarine was also received recently.

• • •

Naval Orders—Comdr. Warren G. Child, det. Aircraft Squadrons, Scouting Fleet; to General Inspector of Naval Aircraft, Eastern Dist., Garden City. L. I. N. Y.

Lt. Comdr. Victor D. Herbster, det. General Inspector of Naval Aircraft, Eastern Dist., Garden City, L. I., N. Y.; to member Board of Inspection and Survey Navy Dept., Washington, D. C.

Comdr. James Spottiswoode Taylor (MC) died League Island, Pa. 8-27-22.

Lieut. Jas. R. Kyle, det. Bu. Aeronautics to Aircraft Squadrons Scouting Fleet.

Lt. (j.g.) Albert P. Burleigh, det. Nav. Air Sta. Pensacola, Fla.; to R. Barracks, Hampton Roads, Va.

Ens. Edwin C. Bain, det. Nav. Air Sta. Pensacola, Fla.; to R. Barracks, Hampton Roads, Va.

Comdr. Frank R. McCrary, det. Nav. Air Sta. San Diego, Calif.; to command Nav. Air Sta. Lakehurst, N. J.

Lt. Nathan B. Chase, det. Board Insp. & Survey, Navy Dept.; to Aircraft Sqds. Battle Flt.

Ens. Myron F. Eddy, det. Aircraft Sqds. Battle Flt.; to Nav. Air Sta. Pearl Harbor, H. T.

Ens. Roland S. Waller, det. Nav. Air Sta. Pearl Harbor, H. T.; to Aircraft Sqds. Battle Flt.

Comdr. Thomas T. Craven, det. all duty; to command Nav. Air Sta. San Diego, Calif.

First Aerial Torpedo Practice—The Navy gunnery schedule for the Atlantic Fleet for this year for the first time includes an attack from the air on the fleet by the Atlantic torpedo squadrons including some eighteen planes. Latest plans provide for the test probably on Sept. 26, about 50 miles off the Virginia Capes. At this time the fleet will be under way off the capes and the torpedo squadrons stationed at Hampton Roads. Simulating to the utmost war-time conditions the squadrons of seaplanes will rise from their base and fly to sea. As soon as they pick up the fleet they will go into attacking formation and when within the correct range they will launch their torpedoes at the ships of the fleet.

The test is to show the practicability of attacking a fleet in motion from the air with torpedoes, and the hits will be recorded just as the hits in gunnery practice, after which the torpedoes will be recovered and salvaged. The aerial missiles will be regulation except that they will have dummy or non-explosive heads, and will weigh about a ton each. The torpedoes are estimated as worth about $8.000 each but the chances are small that any will be lost.

The maneuvers will be under the direction of the Acting Commander in Chief of the Atlantic Fleet, if Admiral Jones on the flagship has not returned from Brazil. Capt. W. E. Gherardi, commands the Atlantic Fleet Air Forces and will control the operations of the Air Squadrons.

* * *

Radio Telegraphy on Navy Planes—Today the Navy's planes rely solely on radio telegraphy for communicating with other planes and land stations or ships, the radio telephone having been practically discarded by Naval pilots, although still used in the Army Air Service. The marine pilots found that telephone sets were impractical. They were too heavy and had inferior ranges, besides being inaccurate and causing much interference. Formerly, they admit, radiophone communication was very convenient for pilots who were not telegraph operators, but today as all Naval aviators are code operators, this advantage is lost. The continuous wave system, known to require skilled operators, was recently requested by the operating units of the Pacific Fleet Air Squadrons to the exclusion of all other methods.

All Naval scouting planes are equipped with radio transmitters capable of sending messages 400 miles, either while in the air or on the sea. While the Navy is not saying much about them, it is known that better and more powerful radio sets are available, held in reserve, while, for economy, the older stock is being used. Spotting planes, however, are equipped with the latest designed continuous wave sets, which have given satisfactory communication when large numbers of planes in the air were transmitting simultaneously.

Recently developed radio apparatus permits a disabled seaplane on the water to transmit up to 300 miles. Compass bearings sent from a distance of 400 miles have been picked up by planes resting on the surface of the sea.

Coming Aeronautical Events

AMERICAN

Oct. 7 — *Detroit Aerial Water Derby, Detroit. (Curtiss Marine Flying Trophy Competition.)*

Oct. 12-14 — *Detroit Aerial Derby, Detroit. (Pulitzer Trophy Race.)*

FOREIGN

September — *Grand Prize of Italy. (International Airplane Competition.) Milan, Italy.*

Sept. 30 — *Coupe Henri Deutsch de la Meurthe. (Airplane speed race.) France.*

Oct. 8 — *International Parachute Competition. Rome, Italy.*

Oct. 16-21 — *British Sailplane Competition. For Daily Mail Prize.*

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WAR DEPARTMENT

In reply refer to 0048 WASHINGTON

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My dear Mr. Redden:

I was very pleased to receive your letter of the 16th inviting my attention to the editorial mention of your activities in the August 14th issue of "Aviation". I am sure that you realize my deep interest in the establishment of a commercial aeronautical industry in this country and that you already know with what gratification I have watched the growth and the success of the operations conducted by Aeromarine Airways, Inc.

With deep regret, I have noted the tendency of the Press to give so great an amount of publicity to airplane accidents because such publicity has served to make the public rather timid and somewhat afraid of air travel and to make our financiers dubious of an investment in aerial transportation. It is hoped that the press as a whole will begin to take cognizance of that which it would appear the editor of "Aviation" has learned from a study of your operations, namely, that air transportation can be conducted with safety to the public and with profit to the investor when the organizations engaged therein are soundly financed and sanely managed.

Yours very truly,

JOHN W. WEEKS
Secretary of War.

C. F. Redden, President,
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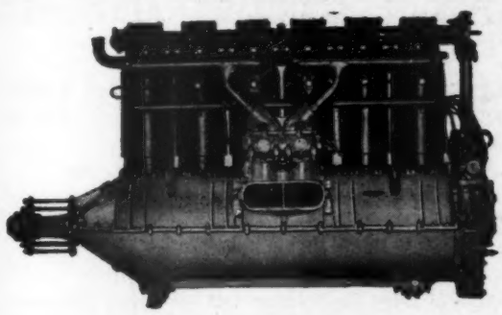

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